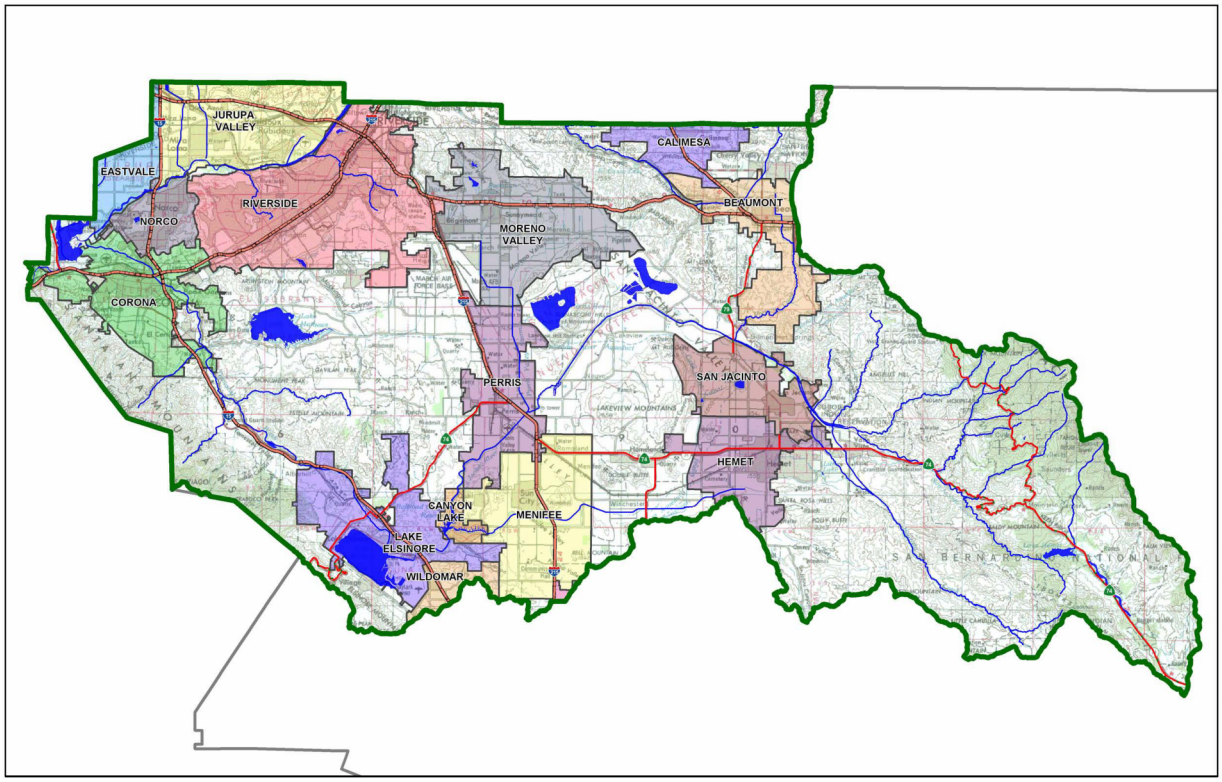
Project Specific Water Quality Management Plan

*A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County*

Project Title: Lake Creek-Placentia

Development No: TBD

Design Review/Case No: P21-00015



☒ **Preliminary**
☐ **Final**

Original Date Prepared: October 18, 2021

Revision Date(s): May 9, 2022; September 25, 2023

Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**
Template revised June 30, 2016

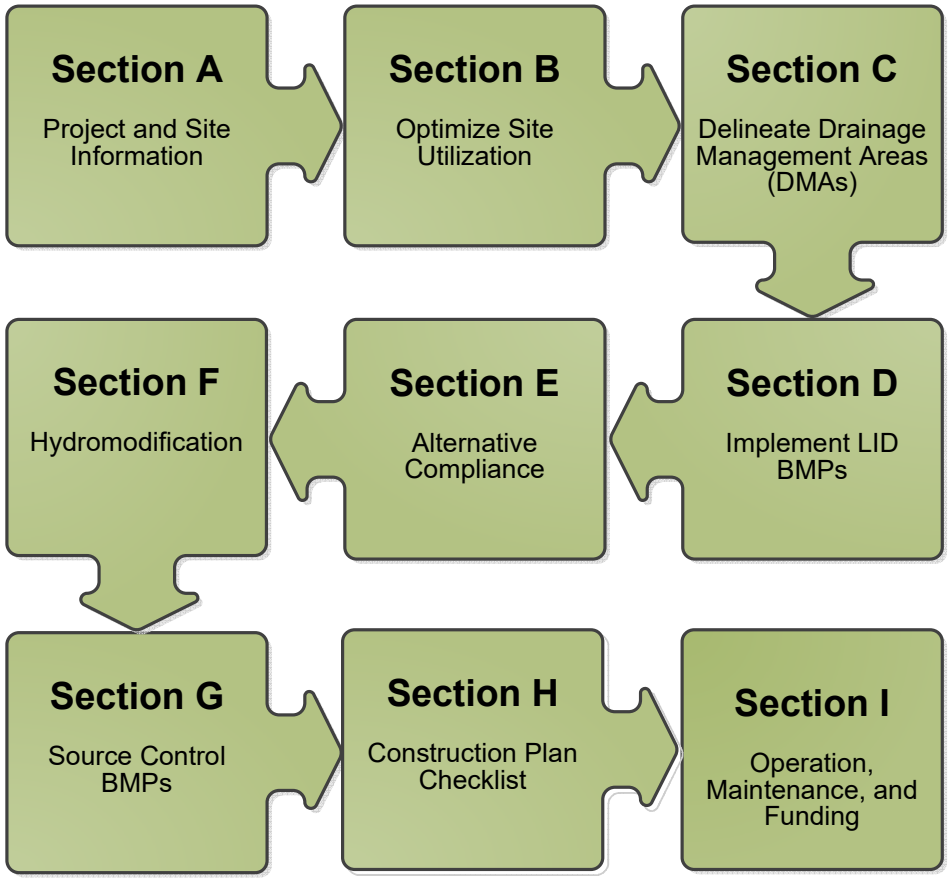
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A Brief Introduction

This Project-Specific WQMP Template for the **Santa Ana Region** has been prepared to help guide you in documenting compliance for your project. Because this document has been designed to specifically document compliance, you will need to utilize the WQMP Guidance Document as your "how-to" manual to help guide you through this process. Both the Template and Guidance Document go hand-in-hand, and will help facilitate a well prepared Project-Specific WQMP. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for The Cubes at Placentia, LLC for the CRG-LCI-Placentia project (P21-00015), located at the northeast corner of the intersection of Placentia Avenue and Wilson Avenue in the City of Perris, California.

This WQMP is intended to comply with the requirements of City of Perris for Water Quality Ordinance 1194, which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under the City of Perris Water Quality Ordinance 1194.

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature	Date
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature	Date
Nobu Murakami	Water Resources Engineer
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

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Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Industrial
Planning Area:	Perris Valley Commerce Center (PVCC) Specific Plan Area
Community Name:	City of Perris
Development Name:	Lake Creek-Placentia
PROJECT LOCATION	
Latitude & Longitude (DMS): 33°49'25.47"N, 117°12'34.92"W	
Project Watershed and Sub-Watershed: Santa Ana (Watershed) Perris Reservoir (Sub Watershed)	
Gross Acres: ~27.9 acres	
APN(s): 300-170-003, 004, 005, 006, 010, 011, 012, 013, 014, 015, 016, and 017	
Map Book and Page No.: Book 15 and Page 69 of Parcel Maps	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Industrial
Proposed or Potential SIC Code(s)	1541
Area of Impervious Project Footprint (SF)	1,018,262 SF
Total Area of proposed Impervious Surfaces within the Project Footprint (SF)/or Replacement	1,018,262 SF
Does the project consist of offsite road improvements?	☒ Y ☐ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N
EXISTING SITE CHARACTERISTICS	
Total area of existing Impervious Surfaces within the Project limits Footprint (SF)	0 SF
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	N/A
Are there any natural hydrologic features on the project site?	☐ Y ☒ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	See Appendix 3 – NRCS Soil Types C & D
What is the Water Quality Design Storm Depth for the project?	0.63 inch

The Cubes at Placentia, LLC is proposing to develop an industrial tilt-up warehouse building and associated parking as part of this project (known as "Lake Creek-Placentia"), which is located at the northeast corner of the intersection of Placentia Avenue and Wilson Street in the City of Perris (within Riverside County), California. A vicinity map is provided in Appendix 1 of this report for reference purpose. Applicable Assessor Parcel Numbers (APNs) are 300-170-003, 004, 005, 006, 011, 012, 013, 014, 015, 016, and 017. The site is approximately 27.9 acres (gross area), consisting of four drainage management areas requiring BMPs and a self-treating area. The proposed warehouse building footprint is approximately 580,900 square feet and there will be a total of ~201 auto parking stalls to be provided. The proposed impervious and pervious footprints within the drainage management area are approximately 1,018,262 square feet and 197,548 square feet, respectively. The project also includes frontage street improvements along Placentia Avenue and Wilson Avenue.

In the existing condition, the site consists of open, undeveloped space, draining generally from northwest to southeast. Runoff from the project generally drains in a southeasterly direction in a sheet flow manner towards Murrieta Avenue (to be vacated) and a vacant parcel (APN 300-170-001). Runoff continues to drain in an easterly direction and eventually discharge into existing Perris Valley Storm Drain Channel (flood control channel). There is an offsite run-on location near the northwesterly corner of the site where off-site flow is

entering to the project via an existing mid-block cross-gutter at the low point along Wilson Street. The flow from the site is conveyed through the site in a southeasterly direction towards the Perris Valley Storm Drain Channel.

In the post-development condition, the proposed improvements will consist of hardscape areas such as roof, asphalt, concrete, ornamental landscape areas, and covered trash enclosures. The post-project drainage characteristic will be maintained as similar to the existing condition. The two run-on areas/flows mentioned above are expected to be conveyed (bypassed) via proposed ditch and/or storm drain pipe around the site that eventually discharge into the existing Perris Valley Storm Drain Channel, as similar to the existing condition drainage characteristics.

In order to comply with the City's ordinance and Santa Ana Region's permanent storm water requirements while maintaining the existing drainage characteristic, best management practices (BMPs) are proposed at four locations on-site, prior to discharging into the proposed flood control facility to be constructed along the Placentia Avenue (i.e. – a frontage portion of MDP "Line H" from Perris Valley Channel up to Wilson Street) that discharge into the existing Perris Valley Storm Drain Channel. Based on our coordination with the City of Perris and RCFC, the project is to construct a dual 9'(w)x7'(h) box culverts as an ultimate buildout facility along frontage Placentia Avenue from the existing Perris Valley Storm Drain (PVSD) Channel up to the Wilson/Placentia intersection.

In support of the infiltration feasibility for the proposed permanent storm water BMP, a geotechnical investigation including infiltration testing was provided. A copy of the geotechnical report is included in Appendix 3. The recommended infiltration rates provided by the project-specific geotechnical engineer were 1.1 in/hour and 0.5 in/hour and they are below the infiltration feasibility threshold of 1.6 inch/hour per the Santa Ana Region WQMP guidance document. Therefore, infiltration is not technically feasible. As such, one (1) bioretention facility, and proprietary BMPs, including Modular Wetland Systems and underground CMP detention pipes (closed systems) are proposed for this project. Specific information about the proposed BMPs are listed below. The bioretention facility is being proposed where practicable for the project. Due to the required parking areas and vertical constraint to provide additional bioretention facilities, proprietary CMP detention pipes (systems) and MWS units are proposed to address the storm water management requirements for the remaining portions of the project. Runoff from the proposed permanent storm water BMPs are anticipated to outlet via proposed storm drain into a proposed MDP Line H facility mentioned above.

- **<u>LID Self-treating landscape areas:</u> The project will provide on-site landscape areas (considered as LID self treating landscape areas) throughout the development. In addition, there will be a pervious self-treating area along westerly perimeters of the project that will drain away from the project.**
- **<u>Covered Trash Enclosure</u> (part of site design and source control): The proposed trash enclosure area will be covered.**
- **<u>Pre-treatment BMPs – 1st Item:</u> The project plans to provide proprietary catch basin insert filters (FloGard Catch Basin Insert Filters by Oldcastle or approved equal) at the select on-site catch basin locations (at 9 locations) to pre-treat the storm water runoff, prior to discharging into the proposed treatment control BMPs listed below.**
- **<u>Treatment Control BMPs (structural BMPs) – 2nd, 3rd and 4th Items</u>:**
    - **"BMP 1" – One (1) Bioretention Facility**
    - **"BMP 2" – One (1) Modular Wetland System MWS-L-4-8-3'-10"-V-UG (Flow-based)**
    - **"BMP 3" – A combination of one (1) Contech 30-inch Diameter CMP Detention Pipes and one (1) Modular Wetland System MWS-L-8-20-3'-6"-V-UG (Volume-based)**
    - **"BMP 4" – A combination of one (1) Contech 30-inch Diameter CMP Detention Pipes and one (1) Modular Wetland System MWS-L-8-16-4'-0"-V-UG (Volume-based)**

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling
- BMP Locations (Lat/Long)

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

A.2 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Perris Valley Storm Drain	N/A	N/A	San Jacinto River Rach 3 (downstream).
San Jacinto River Reach 3 – Canyon Lake to Nuevo Road (HU#802.11)	None	MUN, AGR, GWR, REC1, REC2, WARM, WILD, RARE	This river reach has existing or potential RARE beneficial use.
Canyon Lake (HU#802.11, 802.12)	Nutrients, Pathogens **TMDL Completed** - Nutrients	MUN, AGR, GWR, REC1, REC2, COMM, WARM, WILD	San Jacinto River Reaches 1 (downstream).
San Jacinto River Rach 1 (HU#802.32, 802.31)	None	MUN, AGR, GWR, REC1, REC2, WARM, WILD, RARE	This river reach has existing or potential RARE beneficial use.
Lake Elsinore (HU#802.31)	Nutrients, Organic Enrichment/Low Dissolved Oxygen, PCBs, Toxicity **TMDL Completed** – Nutrients, Organic Enrichment/Low Dissolved Oxygen	MUN, REC1, REC2, COMM, WARM, WILD, RARE	The lake has existing or potential RARE beneficial use.

Note: Based on the direction from the City, the 2012 impairment listing is referenced.

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N
US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage (dependent on tenant)	☒ Y	☐ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)* City of Perris – Grading Permit & Building Permit	☒ Y	☐ N

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, **constraints** might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. **Opportunities** might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Consideration of "highest and best use" of the discharge should also be considered. For example, Lake Elsinore is evaporating faster than runoff from natural precipitation can recharge it. Requiring infiltration of 85% of runoff events for projects tributary to Lake Elsinore would only exacerbate current water quality problems associated with Pollutant concentration due to lake water evaporation. In cases where rainfall events have low potential to recharge Lake Elsinore (i.e. no hydraulic connection between groundwater to Lake Elsinore, or other factors), requiring infiltration of Urban Runoff from projects is counterproductive to the overall watershed goals. Project proponents, in these cases, would be allowed to discharge Urban Runoff, provided they used equally effective filtration-based BMPs.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

In terms of drainage, the existing site generally drains in a southeasterly direction towards to an existing adjacent parcel (by others) and eventually to Perris Valley Channel. In the post-project condition, the drainage pattern will be maintained as similar to the pre-project condition.

Did you identify and protect existing vegetation? If so, how? If not, why?

The site has little to no vegetation on the site. It appears that vegetation has been consistently cleared over many years.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

Where applicable, runoff from the proposed hardscape area will be directed towards landscape area in an effort to promote incidental infiltration and preserve the infiltration capacity. Site-specific

infiltration tests were performed and the geotechnical investigation report indicated recommended field infiltration rates of 1.1 in/hr and 0.5 in/hr, which are below the threshold (1.6 in/hr) for the use of infiltration BMPs. As a result, it was determined that infiltration BMPs were not suitable for the site. As such, one (1) bioretention facility, two (2) proprietary underground CMP detention pipes (storage) and three (3) proprietary Modular Wetland Systems are proposed for this project.

Did you identify and minimize impervious area? If so, how? If not, why?

Impervious areas are only used where necessary and have been minimized to the extent practicable. Parking spaces are minimized close to the required amount and the landscaped areas have been maximized to the extent practicable.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

Runoff from impervious surfaces is directed to the pervious areas where possible prior to being directed to the proposed structural BMP for water quality treatment.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1][2]	Area (Sq. Ft.)	DMA Type
DMA 1-1	Ornamental Landscaping	49,345	Type D
DMA 1-2	Concrete or Asphalt	93,185	Type D
DMA 1-3	Roofs	39,983	Type D
DMA 2-1	Ornamental Landscaping	3,356	Type D
DMA 2-2	Concrete or Asphalt	17,825	Type D
DMA 3-1	Ornamental Landscaping	36,386	Type D
DMA 3-2	Concrete or Asphalt	183,239	Type D
DMA 3-3	Roofs	282,041	Type D
DMA 4-1	Ornamental Landscaping	4,032	Type D
DMA 4-2	Concrete or Asphalt	151,843	Type D
DMA 4-3	Roofs	250,149	Type D
Other STA (Perimeters)	Self Treating Area (STA)	104,426	Type A

[1] *Reference Table 2-1 in the WQMP Guidance Document to populate this column*
[2] *If multi-surface provide back-up*

Table C.2 Type 'A', Self-Treating Areas

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
DMA 1-1	49,345	Landscaping	Drip
DMA 2-1	3,356	Landscaping	Drip
DMA 3-1	36,386	Landscaping	Drip
DMA 4-1	4,032	Landscaping	Drip
STA DMA	104,426	Landscaping	N/A

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				**Type 'C' DMAs that are draining to the Self-Retaining Area**		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]
N/A						

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					**Receiving Self-Retaining DMA**		
DMA Name/ ID	Area (square feet) [A]	Post-project surface type	Impervious fraction [B]	Product [C] = [A] x [B]	DMA name /ID	Area (square feet) [D]	Ratio [C]/[D]
N/A							

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
DMA 1-1	BMP 1 – Bioretention Facility
DMA 1-2	BMP 1 – Bioretention Facility
DMA 1-3	BMP 1 – Bioretention Facility
DMA 2-1	BMP 2 – Modular Wetland System (MWS-L-4-8-3'-10"-V-UG) – flow-based
DMA 2-2	BMP 2 – Modular Wetland System (MWS-L-4-8-3'-10"-V-UG) – flow-based
DMA 3-1	BMP 3 – Contech 30-inch Diameter CMP Detention Pipes (storage) & Modular Wetland System (MWS-L-8-20-3'-6"-V-UG) – volume-based
DMA 3-2	BMP 3 – Contech 30-inch Diameter CMP Detention Pipes (storage) & Modular Wetland System (MWS-L-8-20-3'-6"-V-UG) – volume-based
DMA 3-3	BMP 3 – Contech 30-inch Diameter CMP Detention Pipes (storage) & Modular Wetland System (MWS-L-8-20-3'-6"-V-UG) – volume-based
DMA 4-1	BMP 4 – Contech 30-inch Diameter CMP Detention Pipes (storage) & Modular Wetland System (MWS-L-8-16-4'-0"-V-UG) – volume-based
DMA 4-2	BMP 4 – Contech 30-inch Diameter CMP Detention Pipes (storage) & Modular Wetland System (MWS-L-8-16-4'-0"-V-UG) – volume-based
DMA 4-3	BMP 4 – Contech 30-inch Diameter CMP Detention Pipes (storage) & Modular Wetland System (MWS-L-8-16-4'-0"-V-UG) – volume-based

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

If yes has been checked, Infiltration BMPs shall not be used for the site; proceed to section D.3

If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		✓
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		✓
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		✓
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?	✓	
If Yes, list affected DMAs:		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		✓
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?		✓
Describe here:		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

D.2 Harvest and Use Assessment

Please check what applies*:*

☐ Reclaimed water will be used for the non-potable water demands for the project.

☐Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).

☐The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If none of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: Insert Area (Acres)

Type of Landscaping (Conservation Design or Active Turf): List Landscaping Type

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: Insert Area (Acres)

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: EIATIA Factor

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: Insert Area (Acres)

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
Insert Area (Acres)	Insert Area (Acres)

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: Number of daily Toilet Users

Project Type: Enter 'Residential', 'Commercial', 'Industrial' or 'Schools'

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: Insert Area (Acres)

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-2 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: TUTIA Factor

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: Required number of toilet users

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	**Projected number of toilet users (Step 1)**
Insert Area (Acres)	Insert Area (Acres)

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

Insert narrative description here.

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: Projected Average Daily Use (gpd)

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: Insert Area (Acres)

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-4 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-4: Enter Value

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: Minimum use required (gpd)

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the projected average daily use (Step 1) to the minimum required non-potable use (Step 4).

Minimum required non-potable use (Step 4)	**Projected average daily use (Step 1)**
Minimum use required (gpd)	Projected Average Daily Use (gpd)

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment per Section 3.4.2 of the WQMP Guidance Document.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

Note: DMA 1 will be treated by a LID Bioretention BMP. DMA 2 will be treated by a Modular Wetland System (flow-based). DMA 3 and DMA 4 will be treated via a combination of the proposed CMP detention pipes (storage) and Modular Wetland System (volume-based).

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
DMA 1-1	☐	☐	☒	☐	☐
DMA 1-2	☐	☐	☒	☐	☐
DMA 1-3	☐	☐	☒	☐	☐
DMA 2-1	☐	☐	☐	☐	☒
DMA 2-2	☐	☐	☐	☐	☒
DMA 3-1	☐	☐	☐	☐	☒
DMA 3-2	☐	☐	☐	☐	☒
DMA 3-3	☐	☐	☐	☐	☒
DMA 4-1	☐	☐	☐	☐	☒
DMA 4-2	☐	☐	☐	☐	☒
DMA 4-3	☐	☐	☐	☐	☒

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

Note: Note: As indicated above, based on the measured infiltration rate by the project-specific geotechnical engineer, infiltration BMPs not technically feasible/suitable. As such, DMA 1 will be treated by a LID Bioretention BMP. DMA 2 will be treated by a Modular Wetland System (flow-based). DMA 3 and DMA 4 will be treated via a combination of the proposed CMP detention pipes (storage) and Modular Wetland System (volume-based). Once treated, runoff from the proposed permanent storm water BMPs will outlet into a proposed flood control facility along frontage Placentia Avenue.

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First**,** calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second**,** design the LID BMP to meet the required V_{BMP} using a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BMP 1 – Bioretention Facility*		
	[A]		[B]	[C]	[A] x [C]			
DMA 1-1	*49,345*	*Ornamental Landscaping*	*0.1*	*0.11*	*5450.6*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA 1-2	*93,185*	*Concrete or Asphalt*	*1.0*	*0.89*	*83121*			
DMA 1-3	*39,983*	*Roofs*	*1.0*	*0.89*	*35664.8*			
	A_T = Σ[A] 182,513				Σ= [D] 124236.4	[E] 0.63	$[F] = \frac{[D]x[E]}{12}$ 6522.4	[G] 6,631

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document.

[E] is obtained from Exhibit A in the WQMP Guidance Document.

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6.

Table D.4 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BMP 2 – Modular Wetland System (MWS-L-4-8-3'-10"-V-UG) – flow-based*		
	[A]		[B]	[C]	[A] x [C]			
DMA 2-1	*3,356*	*Ornamental Landscaping*	*0.1*	*0.11*	*370.7*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA 2-2	*17,825*	*Concrete or Asphalt*	*1.0*	*0.89*	*15899.9*			
	A_T = Σ[A] 21,181				Σ= [D] 16270.6	[E] 0.63	$[F] = \frac{[D]x[E]}{12}$ 854.2	[G] N/A – Flow-based MWS. See Table E.4

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document.

[E] is obtained from Exhibit A in the WQMP Guidance Document.

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6.

Table D.5 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BMP 3 – Contech 30-inch Diameter CMP Detention Pipes (storage) or Approved Equal*		
	[A]		[B]	[C]	[A] x [C]			
DMA 3-1	*36,386*	*Ornamental Landscaping*	*0.1*	*0.11*	*4019.1*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA 3-2	*183,239*	*Concrete or Asphalt*	*1.0*	*0.89*	*163449.2*			
DMA 3-3	*282,041*	*Roofs*	*1.0*	*0.89*	*251580.6*			
	A_T = Σ[A] 501,666				Σ= [D] 419048.9	[E] 0.63	$[F] = \frac{[D]x[E]}{12}$ 22000.1	[G] 22,101

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document.

[E] is obtained from Exhibit A in the WQMP Guidance Document.

[G] is obtained from the proprietary BMP manufacturer (i.e. – Contech Engineered Solutions, LLC). As a note, a combination of an underground storage facility and treatment units (MWS) is provided to address the storm water management requirements.

Table D.6 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BMP 3 – Modular Wetland System (MWS-L-8-20-3'-6"-V-UG) – volume-based*		
	[A]		[B]	[C]	[A] x [C]			
DMA 3-1	*36,386*	*Ornamental Landscaping*	*0.1*	*0.11*	*4019.1*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA 3-2	*183,239*	*Concrete or Asphalt*	*1.0*	*0.89*	*163449.2*			
DMA 3-3	*282,041*	*Roofs*	*1.0*	*0.89*	*251580.6*			
	A_T = Σ[A] 501,666				Σ= [D] 419048.9	[E] 0.63	$[F] = \frac{[D]x[E]}{12}$ 22000.1	[G] 22,001

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document.

[E] is obtained from Exhibit A in the WQMP Guidance Document.

[G] is obtained from the proprietary BMP manufacturer (i.e. – Contech Engineered Solutions, LLC) based on the treatment HGL and MWS media loading rate.

Table D.7 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BMP 4 – Contech 30-inch Diameter CMP Detention Pipes (storage) or Approved Equal*		
	[A]		[B]	[C]	[A] x [C]			
DMA 4-1	*4,032*	*Ornamental Landscaping*	*0.1*	*0.11*	*445.4*			
DMA 4-2	*151,843*	*Concrete or Asphalt*	*1.0*	*0.89*	*135444*			
DMA 4-3	*250,149*	*Roofs*	*1.0*	*0.89*	*223132.9*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	A_T = Σ[A] 406,024				Σ= [D] 359022.3	[E] 0.63	$[F] = \frac{[D]x[E]}{12}$ 18848.7	[G] 18,860

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document.

[E] is obtained from Exhibit A in the WQMP Guidance Document.

[G] is obtained from the proprietary BMP manufacturer (i.e. – Contech Engineered Solutions, LLC). As a note, a combination of an underground storage facility and treatment units (MWS) is provided to address the storm water management requirements.

Table D.8 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BMP 4 – Modular Wetland System (MWS-L-8-16-4'-0"-V-UG) – volume-based*		
	[A]		[B]	[C]	[A] x [C]			
DMA 4-1	*4,032*	*Ornamental Landscaping*	*0.1*	*0.11*	*445.4*			
DMA 4-2	*151,843*	*Concrete or Asphalt*	*1.0*	*0.89*	*135444*			
DMA 4-3	*250,149*	*Roofs*	*1.0*	*0.89*	*223132.9*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	A_T = Σ[A] 406,024				Σ= [D] 359022.3	[E] 0.63	$[F] = \frac{[D]x[E]}{12}$ 18848.7	[G] 18,849

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document.

[E] is obtained from Exhibit A in the WQMP Guidance Document.

[G] is obtained from the proprietary BMP manufacturer (i.e. – Contech Engineered Solutions, LLC) based on the treatment HGL and MWS media loading rate.

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

☒ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. **No alternative compliance measures are required for this project and thus this Section is not required to be completed.**

- Or -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

Note: DMA 1 will be treated by a LID Bioretention BMP. DMA 2 will be treated by a Modular Wetland System (flow-based). DMA 3 and DMA 4 will be treated via a combination of the proposed CMP detention pipes (storage) and Modular Wetland System (volume-based). As a result, applicable parts of this Section have been completed for proposed MWS units.

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☐ Detached Residential Development	P	N	P	P	N	P	P	P
☐ Attached Residential Development	P	N	P	P	N	P	P	P(2)
☒ Commercial/Industrial Development	P(3)	P	P(1)	P(1)	P(5)	P(1)	P	P
☐ Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P
☐ Restaurants (>5,000 ft^2)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft^2)	P	N	P	P	N	P	P	P
☐ Parking Lots (>5,000 ft^2)	P(6)	P	P(1)	P(1)	P(4)	P(1)	P	P
☐ Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	☐	☒	☒	☒	☒	☒	☒	☒

P = Potential

N = Not Potential

(1) A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected

(2) A potential Pollutant if the project includes uncovered parking areas; otherwise not expected

(3) A potential Pollutant is land use involving animal waste

(4) Specifically petroleum hydrocarbons

(5) Specifically solvents

(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
N/A	
Total Credit Percentage[1]	

[1] *Cannot Exceed 50%*
[2] *Obtain corresponding data from Table 3-8 in the WQMP Guidance Document*

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Area x Runoff Factor		*BMP 2 – Modular Wetland System (MWS-L-4-8-3'-10"-V-UG) – flow-based*		
	[A]		[B]	[C]	[A] x [C]				
DMA 2-1	*3,356*	*Ornamental Landscaping*	*0.1*	*0.11*	*370.7*	*Design Storm Depth (in)*	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
DMA 2-2	*17,825*	*Concrete or Asphalt*	*1.0*	*0.892*	*15899.9*				
	A_T = Σ[A] 21,181				Σ= [D] 16270.6	[E] 0.20	$[F] = \frac{[D]x[E]}{[G]}$ 0.075	[F] X (1-[H]) N/A	[I] 0.115

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document
[E] is for Flow-Based Treatment Control BMPs [E] = .2, for Volume-Based Control Treatment BMPs, [E] obtained from Exhibit A in the WQMP Guidance Document
[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12
[H] is from the Total Credit Percentage as Calculated from Table E.2 above
[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6.

Table E.4 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Area x Runoff Factor		*BMP 3 – Contech 30-inch Diameter CMP Detention Pipes (storage) or Approved Equal*		
	[A]		[B]	[C]	[A] x [C]				
DMA 3-1	*36,386*	*Ornamental Landscaping*	*0.1*	*0.11*	*4889.2*	*Design Storm Depth (in)*	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
DMA 3-2	*183,239*	*Concrete or Asphalt*	*1.0*	*0.892*	*177628.4*				
DMA 3-3	*282,041*	*Roofs*	*1.0*	*0.892*	*128167*				
	A_T = Σ[A] 501,666				Σ= [D] 419048.9	[E] 0.20	$[F] = \frac{[D]x[E]}{[G]}$ 1.9	[F] X (1-[H]) N/A	[I] Min. 1.9 cfs N/A (Volume-based)

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document

[E] is for Flow-Based Treatment Control BMPs [E] = .2, for Volume-Based Control Treatment BMPs, [E] obtained from Exhibit A in the WQMP Guidance Document

[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12

[H] is from the Total Credit Percentage as Calculated from Table E.2 above

[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6. It is important to note that this Modular Wetland System was sized using the volume-based approach by storing the minimum required design capture volume in a proposed underground storage facility (i.e. – Contech CMP Detention Pipes) located upstream of the MWS.

Table E.5 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Area x Runoff Factor		*BMP 3 – Modular Wetland System (MWS-L-8-20-3'-6"-V-UG) – volume-based*		
	[A]		[B]	[C]	[A] x [C]				
DMA 3-1	*36,386*	*Ornamental Landscaping*	*0.1*	*0.11*	*4889.2*	*Design Storm Depth (in)*	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
DMA 3-2	*183,239*	*Concrete or Asphalt*	*1.0*	*0.892*	*177628.4*				
DMA 3-3	*282,041*	*Roofs*	*1.0*	*0.892*	*128167*				
	A_T = Σ[A] 501,666				Σ= [D] 419048.9	[E] 0.20	$[F] = \frac{[D]x[E]}{[G]}$ 1.9	[F] X (1-[H]) N/A	[I] Min. 1.9 cfs N/A (Volume-based)

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document

[E] is for Flow-Based Treatment Control BMPs [E] = .2, for Volume-Based Control Treatment BMPs, [E] obtained from Exhibit A in the WQMP Guidance Document

[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12

[H] is from the Total Credit Percentage as Calculated from Table E.2 above

[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6. It is important to note that this Modular Wetland System was sized using the volume-based approach by storing the minimum required design capture volume in a proposed underground storage facility (i.e. – Contech CMP Detention Pipes) located upstream of the MWS.

Table E.6 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperviousness Fraction, I_f	DMA Runoff Factor	DMA Area x Runoff Factor		*BMP 4 – Contech 30-inch Diameter CMP Detention Pipes (storage) or Approved Equal*		
	[A]		[B]	[C]	[A] x [C]				
DMA 4-1	*4,032*	*Ornamental Landscaping*	*0.1*	*0.11*	*4889.2*	*Design Storm Depth (in)*	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
DMA 4-2	*151,843*	*Concrete or Asphalt*	*1.0*	*0.892*	*177628.4*				
DMA 4-3	*250,149*	*Roofs*	*1.0*	*0.892*	*128167*				
	A_T = Σ[A] 406,024				Σ= [D] 359022.3	[E] 0.20	$[F] = \frac{[D]x[E]}{[G]}$ 1.6	[F] X (1-[H]) N/A	[I] Min. 1.6 cfs N/A (Volume-based)

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document

[E] is for Flow-Based Treatment Control BMPs [E] = .2, for Volume-Based Control Treatment BMPs, [E] obtained from Exhibit A in the WQMP Guidance Document

[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12

[H] is from the Total Credit Percentage as Calculated from Table E.2 above

[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6. It is important to note that this Modular Wetland System was sized using the volume-based approach by storing the minimum required design capture volume in a proposed underground storage facility (i.e. – Contech CMP Detention Pipes) located upstream of the MWS.

Table E.7 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperviousness Fraction, I_f	DMA Runoff Factor	DMA Area x Runoff Factor		*BMP 4 – Modular Wetland System (MWS-L-8-16-4'-0"-V-UG) – volume-based*		
	[A]		[B]	[C]	[A] x [C]				
DMA 4-1	*4,032*	*Ornamental Landscaping*	*0.1*	*0.11*	*4889.2*	*Design Storm Depth (in)*	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
DMA 4-2	*151,843*	*Concrete or Asphalt*	*1.0*	*0.892*	*177628.4*				
DMA 4-3	*250,149*	*Roofs*	*1.0*	*0.892*	*128167*				
	A_T = Σ[A] 406,024				Σ= [D] 359022.3	[E] 0.20	$[F] = \frac{[D]x[E]}{[G]}$ 1.6	[F] X (1-[H]) N/A	[I] Min. 1.6 cfs N/A (Volume-based)

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document

[E] is for Flow-Based Treatment Control BMPs [E] = .2, for Volume-Based Control Treatment BMPs, [E] obtained from Exhibit A in the WQMP Guidance Document

[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12

[H] is from the Total Credit Percentage as Calculated from Table E.2 above

[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6. It is important to note that this Modular Wetland System was sized using the volume-based approach by storing the minimum required design capture volume in a proposed underground storage facility (i.e. – Contech CMP Detention Pipes) located upstream of the MWS.

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High**: equal to or greater than 80% removal efficiency
- **Medium**: between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.8 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]
Modular Wetland System (BMP 2, BMP 3, and BMP 4)	Metals, Nutrients, Pesticides, Toxic Organic Compounds, Sediments, Trash & Debris, and Oil & Grease	Metal (Medium), Nutrients/Pesticides (Medium), Toxic Organic Compounds (Medium), Sediments (High), Trash & Debris (High), Oil & Grease (High)

[1] *Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.*
[2] *Cross Reference Table E.1 above to populate this column.*
[3] *As documented in a Co-Permittee Approved Study and provided in Appendix 6.*

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration	N/A		
Volume (Cubic Feet)			

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Susceptibility Maps.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

Note: The project is within the Riverside County WAP HCOC Exemption area approved on April 20, 2017. Therefore, the project should be exempt from the HCOC requirements.

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and "housekeeping", that must be implemented by the site's occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources*:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit*:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative*:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site storm drain inlets	Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.	Maintain and repaint (or replace) inlet markings annually to maintain clear legibility. Provide stormwater pollution prevention information to new site owners, lessees, or operators. See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so

		as to create a potential discharge to storm drain."
Interior floor drains	Interior floor drains shall be plumbed to sanitary sewer.	Inspect and maintain drains to prevent blockages and overflow.
Need for future indoor & structural pest control	Building design features including sealants barriers and fully closing windows and doors have been included to discourage entry of pests.	Integrated Pest Management (IPM) information to be provided to owners, lessees, and operators.
Landscape/outdoor pesticide use	Final Landscape Plans will accomplish the following: Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. Consider using pest-resistant plants, especially adjacent to hardscape. To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	Maintain landscaping monthly (and on an as-needed basis) using minimum or no pesticides. Prevent erosion of slopes by planting fast-growing, dense ground covering plants. Plant native vegetation to reduce the amount of water, fertilizers, and pesticides applied to the landscape. Do not overwater. Use irrigation practices such as drip irrigation, soaker hoses or micro-spray systems. Periodically inspect and fix leaks and misdirected sprinklers. Do not rake or blow leaves, clippings, or pruning waste into the street, gutter, or storm drain. Instead, dispose of green waste by composting, hauling it to a permitted landfill, or recycling it through your city's program. Integrated Pest Management (IPM) information to be provided to owners, lessees, and operators.
Refuse areas	Site design features dumpster enclosures. Signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	Weekly inspections for leaky, overfilled, uncovered, or other problematic conditions will occur. Corrective action will be made upon detection, as circumstances permit. Dumping of liquid or hazardous wastes will be prohibited. Spill control materials will be available on-site. All wastes to properly stored and disposed of in accordance with all applicable Local, State and Federal regulations
Industrial Processes	All process activities to be performed indoors. No processes to drain to exterior or to storm drain system.	All process activities to be performed indoors. No processes to drain to exterior or to storm drain system. See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com See the brochure "Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities" at http://rcflood.org/stormwater/
Loading Docks	Maintain in a clean and orderly fashion. Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed	Move loaded and unloaded items indoors as soon as possible. See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA

	during periods of operation. Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.	Stormwater Quality Handbooks at www.cabmphandbooks.com
Fire Sprinkler Test Water	Provide a means to drain fire sprinkler test water to the sanitary sewer.	See the note in the Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
Miscellaneous Drain or Wash Water or Other Sources	Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain. Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary. Any drainage sumps on-site shall feature a sediment sump to reduce pumped water. Roofing, gutters, and trim made out of unprotected metals that may leach into runoff shall be avoided.	Inspect quarterly to verify that these miscellaneous drain and equipment are not leaking or discharging to the storm drain system.
Plazas, Sidewalks, and Parking Lots	Maintain in a clean and orderly fashion.	Sweep plazas, sidewalks, and parking lots monthly (and on an as-needed basis) to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect wash water containing any cleaning agent or degreaser and discharge to the sanitary sewer, not to a storm drain.

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)	BMP Location (Lat/Long)
BMP 1	Bioretention Facility (BMP 1)	Precise Grading Plan Sheet #: TBD	33°49'24.51" N / 117°12'43.99" W (Approx.)
BMP 2	Modular Wetland System (MWS-L-4-8-3'-10"-V-UG) (BMP 2)	Precise Grading Plan Sheet #: TBD	33°49'27.39" N / 117°12'31.40" W (Approx.)
BMP 3	Contech CMP Detention Pipes (30"-diameter) and Modular Wetland System (MWS-L-8-20-3'-6"-V-UG) (BMP 3)	Precise Grading Plan Sheet #: TBD	33°49'32.51" N / 117°12'33.35" W (Approx.)
BMP 4	Contech CMP Detention Pipes (30"-diameter) and Modular Wetland System (MWS-L-8-16-4'-0"-V-UG) (BMP 4)	Precise Grading Plan Sheet #: TBD	33°49'24.58" N / 117°12'34.38" W (Approx.)

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Note: The corresponding plan sheet numbers in the above table will be included at the time of the Final WQMP.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: See Appendix 9

Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

☐ Y ☒ N

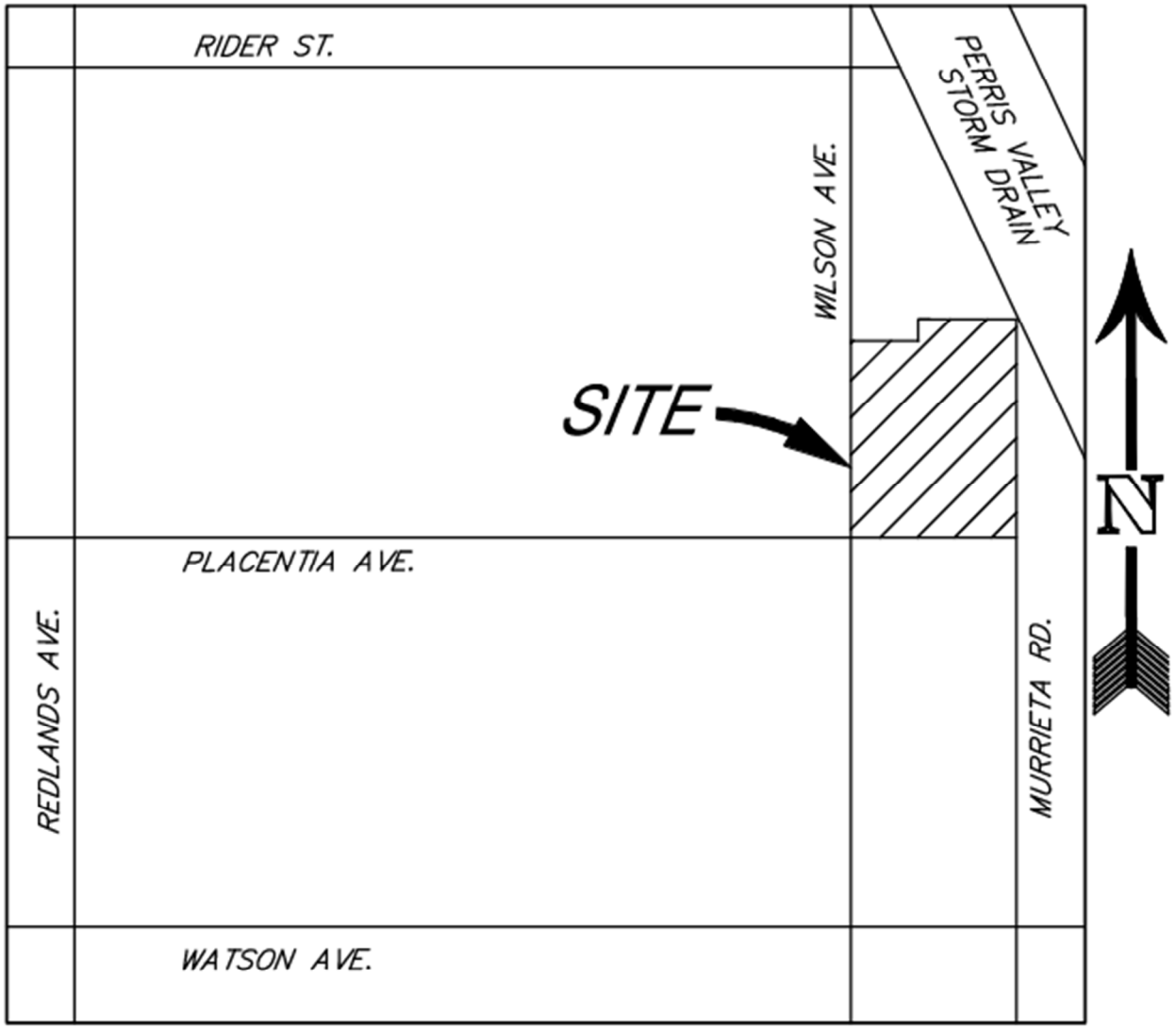
Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

Note: To be completed at the time of the FWQMP.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

Vicinity Map

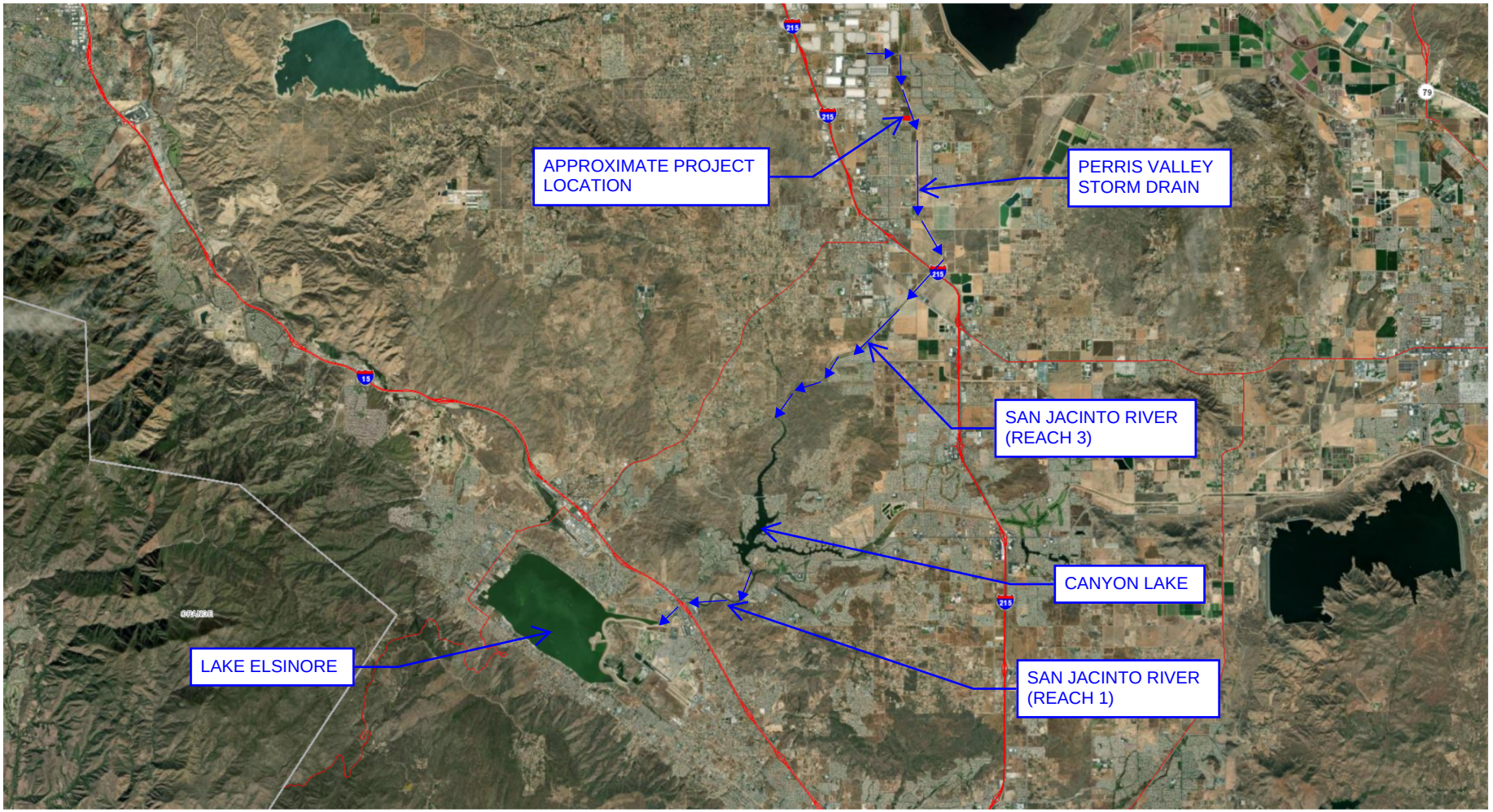


VICINITY MAP
NOT TO SCALE

The project is located at the northeast corner of the intersection of Placentia Avenue and Wilson Avenue in the City of Perris, CA.

SCREEN CAPTURE - RIVERSIDE COUNTY STORMWATER & WATER CONSERVATION TRACKING TOOL

RECEIVING WATER MAP - SUPPORTING MATERIALS



Riverside County
SWCTT

Stormwater Map

Site Address: rivco.permitrack.com

DMA PLAN
LAKE CREEK-PLACENTIA

DMA LEGEND & AREAS

DRAINAGE MANAGEMENT AREA

DISCHARGE LOCATION

DMA LEGEND & AREAS

DMAs DRAINING TO PERMANENT STRUCTURAL BMP

DMA 1

DMA 1–1 (ORNAMENTAL LANDSCAPING) – 49,345 S.F.

DMA 1–2 (CONCRETE OR ASPHALT) – 93,185 S.F.

DMA 1–3 (ROOFS) – 39,983 S.F.

TOTAL AREA = 182,513 S.F.

DMA 2

DMA 2–1 (ORNAMENTAL LANDSCAPING) – 3,356 S.F.

DMA 2–2 (CONCRETE OR ASPHALT) – 17,825 S.F.

TOTAL AREA = 21,181 S.F.

DMA 3

DMA 3–1 (ORNAMENTAL LANDSCAPING) – 36,386 S.F.

DMA 3–2 (CONCRETE OR ASPHALT) – 183,239 S.F.

DMA 3–3 (ROOFS) – 282,041 S.F.

TOTAL AREA = 501,666 S.F.

DMA 4

DMA 4–1 (ORNAMENTAL LANDSCAPING) – 4,032 S.F.

DMA 4–2 (CONCRETE OR ASPHALT) – 151,843 S.F.

DMA 4–3 (ROOFS) – 250,149 S.F.

TOTAL AREA = 406,024 S.F.

MISC. - OTHER DMAs

SELF–TREATING AREA (STA) DMA – 104,426 S.F.

PERMANENT STRUCTURAL BMP

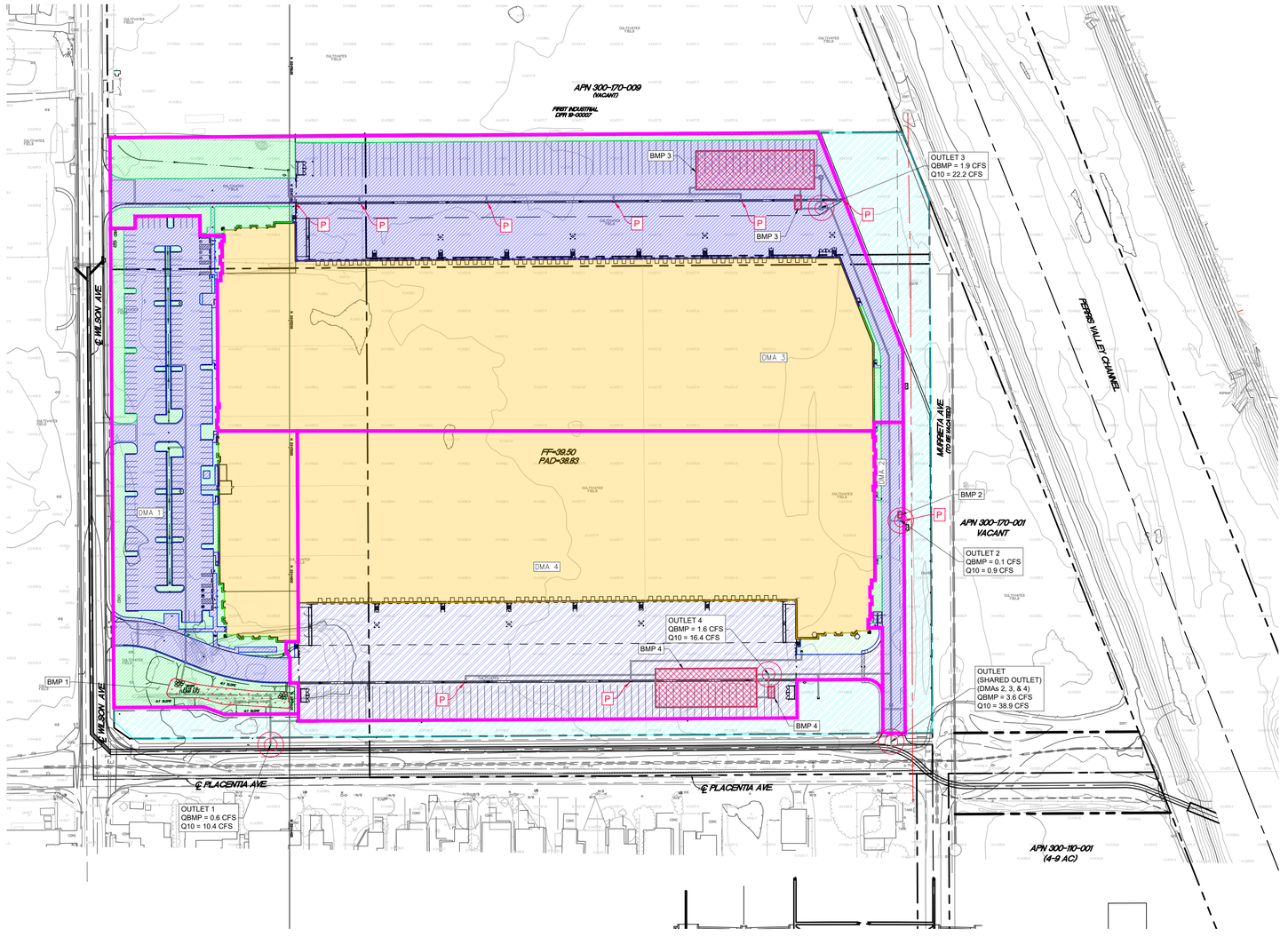
PROPOSED BIORETENTION FACILITY
- BMP 1 (BOTTOM FOOTPRINT PROVIDED): ~4,700 S.F.

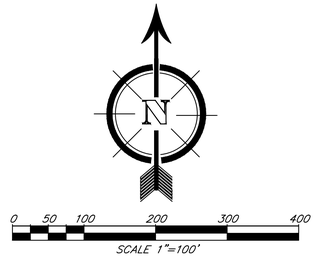
PROPOSED CONTECH CMP DETENTION SYSTEM
- BMP 3 (30"–DIAMETER CMP DETENTION SYSTEM); VOL. PROVIDED: ~22,101 CF
- BMP 4 (30"–DIAMETER CMP DETENTION SYSTEM); VOL. PROVIDED: ~18,860 CF

PROPOSED MODULAR WETLAND SYSTEM (MWS)
- BMP 2 (MWS–L–4–8–3'–10"–V–UG; FLOW–BASED); Qt PROVIDED: ~0.115 CFS
- BMP 3 (MWS–L–8–20–3'–6"–V–UG; VOLUME–BASED); VOL. PROVIDED: ~22,001 CF
- BMP 4 (MWS–L–8–16–4'–0"–V–UG; VOLUME–BASED); VOL. PROVIDED: ~18,849 CF

PRE-TREATMENT BMP

PRE–TREATMENT BMP – PROPOSED FLOGARD +PLUS CATCH BASIN INSERT FILTER BY OLDCASTLE INFRASTRUCTURE
- PRE–TREATMENT DEVICE AT SELECT CATCH BASIN LOCATIONS





REVISED: SEPTEMBER 2023

CITY OF PERRIS	
DMA PLAN	1 OF 3 SHEETS
LAKE CREEK-PLACENTIA (CITY CASE NO. P21-00015)	

POST-CONSTRUCTION BMP SITE PLAN
LAKE CREEK-PLACENTIA

GENERAL NOTES

1. THERE IS AN OFFSITE RUN-ON LOCATION NEAR THE NORTHWESTERLY CORNER OF THE SITE WHERE OFF-SITE FLOW IS ENTERING TO THE PROJECT VIA AN EXISTING MID-BLOCK CROSS-GUTTER AT THE LOW POINT ALONG WILSON STREET. IN THE POST-PROJECT CONDITION, THE OFFSITE RUN-ON WILL BE CAPTURED AND CONVEYED (BYPASSED) AROUND THE SITE VIA PROPOSED FRONTAGE STORM DRAIN SYSTEMS ALONG WILSON AVENUE AND PLACENTIA AVENUE TOWARDS THE EXISTING PERRIS VALLEY STORM DRAIN CHANNEL, IN ORDER TO MAINTAIN THE EXISTING DRAINAGE CHARACTERISTICS.
2. BASED ON OUR COORDINATION WITH THE CITY OF PERRIS AND RCFC, THE PROJECT IS TO CONSTRUCT A STORM DRAIN FACILITY AS AN ULTIMATE BUILDOUT SYSTEM ALONG FRONTAGE PLACENTIA AVENUE FROM THE EXISTING PERRIS VALLEY STORM DRAIN (PVSD) CHANNEL UP TO THE WILSON/PLACENTIA INTERSECTION. THE PROJECT ALSO PLANS TO CONSTRUCT A LATERAL STORM DRAIN PIPE ALONG WILSON AVENUE TO THE AFOREMENTIONED LOW POINT, IN ORDER TO COLLECT THE OFFSITE RUN-ON. THIS IS BEING ADDRESSED SEPARATELY.
3. AN EASTERLY PORTION OF THE PROPOSED IMPROVEMENTS (SURFACE PARKING AND LANDSCAPING AREAS) WILL BE SITUATED WITHIN THE FEMA'S ZONE AE FLOOD FRINGE. THE PROJECT IS TO PROCESS A CONDITIONAL LETTER OF MAP REVISION THROUGH FEMA. THE PROPOSED BUILDING'S PAD ELEVATION IS TO BE SET AT LEAST 1 FOOT ABOVE THE FEMA'S BASE FLOOD ELEVATION (BFE) AT THIS LOCATION (BFE = ~1437.1 AT FEMA CROSS-SECTION "J", BASED ON NAVD88 VERTICAL DATUM). THIS IS BEING ADDRESSED SEPARATELY.
4. PRELIMINARY DETAILS FOR TRASH ENCLOSURE WITH COVER, STENCIL, AND/OR ROOF DRAIN OUTLET LOCATIONS ARE PROVIDED ON THIS EXHIBIT OR BMP DETAIL SHEET; HOWEVER, THOSE DETAILS COULD BE REFINED FURTHER AT THE TIME OF FINAL WQMP.

PERMANENT SOURCE CONTROL BMPs

(1) MARK ALL INLETS WITH THE WORDS "ONLY RAIN DOWN THE STORM DRAIN" OR SIMILAR
(2) ENCLOSED REFUSE AREA WITH SIGNS POSTED NEARBY STATING "DO NOT DUMP HAZARDOUS MATERIALS HERE" OR SIMILAR
- LANDSCAPING DESIGNED TO MINIMIZE IRRIGATION AND RUNOFF, TO PROMOTE SURFACE INFILTRATION WHERE APPROPRIATE, AND TO MINIMIZE THE USE OF FERTILIZERS AND PESTICIDES THAT CAN CONTRIBUTE TO STORMWATER POLLUTION.

OPERATIONAL SOURCE CONTROL BMPs

- MAINTAIN LANDCAPING USING MINIMUM OR NO PESTICIDES
- PREVENT EROSION OF SLOPES BY PLANTING FAST-GROWING, DENSE GROUND COVERING PLANTS
- PLANT NATIVE VEGETATION TO REDUCE THE AMOUNT OF WATER, FERTILIZERS, AND PESTICIDES APPLIED TO THE LANDSCAPE
- DO NOT OVERWATER
- USE IRRIGATION PRACTICES SUCH AS DRIP IRRIGATION, SOAKER HOSES OR MICRO-SPRAY SYSTEMS
- PERIODICALLY INSPECT AND FIX LEAKS AND MISDIRECTED SPRINKLERS.
- DO NOT RAKE OR BLOW LEAVES, CLIPPINGS, OR PRUNING WASTE INTO THE STREET, GUTTER OR STORM DRAIN
- DISPOSE OF GREEN WASTE BY COMPOSTING, HAULING IT TO A PERMITTED LANDFILL, OR RECYCLING IT THROUGH YOUR CITY'S PROGRAM
- PROVIDE IPM INFORMATION TO NEW OWNERS, LESSEES AND OPERATORS
- PERIODIC INSPECTIONS FOR LEAKY, OVERFILLED, UNCOVERED, OR OTHER PROBLEMATIC CONDITIONS WILL OCCUR
- CORRECTIVE ACTION WILL BE MADE UPON DETECTION, AS CIRCUMSTANCES PERMIT
- DUMPING OF LIQUID OR HAZARDOUS WASTES WILL BE PROHIBITED
- SPILL CONTROL MATERIALS WILL BE AVAILABLE ON-SITE
- MOVE LOADED AND UNLOADED ITEMS INDOORS AS SOON AS POSSIBLE
- SWEEP PLAZAS, SIDEWALKS, AND PARKING LOTS REGULARLY TO PREVENT ACCUMULATION OF LITTER AND DEBRIS
- COLLECT DEBRIS FROM PRESSURE WASHING TO PREVENT ENTRY INTO THE STORM DRAIN SYSTEM
- COLLECT WASHWATER CONTAINING ANY CLEANING AGENT OR DEGREASER AND DISCHARGE TO THE SANITARY SEWER (NOT TO THE STORM DRAIN)

LID OPPORTUNITIES

1. PRESERVE EXISTING PERVIOUS AREA WHERE POSSIBLE.
2. LANDSCAPED AREAS DESIGNED TO BE SELF-RETAINING WHERE FEASIBLE.

DMA LEGEND & AREAS

DMAs DRAINING TO PERMANENT STRUCTURAL BMP

DMA 1

DMA 1-1 (ORNAMENTAL LANDSCAPING) = 49,345 S.F.
DMA 1-2 (CONCRETE OR ASPHALT) = 93,185 S.F.
DMA 1-3 (ROOFS) = 39,983 S.F.

TOTAL AREA = 182,513 S.F.

DMA 2

DMA 2-1 (ORNAMENTAL LANDSCAPING) = 3,356 S.F.
DMA 2-2 (CONCRETE OR ASPHALT) = 17,825 S.F.

TOTAL AREA = 21,181 S.F.

DMA 3

DMA 3-1 (ORNAMENTAL LANDSCAPING) = 36,386 S.F.
DMA 3-2 (CONCRETE OR ASPHALT) = 183,239 S.F.
DMA 3-3 (ROOFS) = 282,041 S.F.

TOTAL AREA = 501,666 S.F.

DMA 4

DMA 4-1 (ORNAMENTAL LANDSCAPING) = 4,032 S.F.
DMA 4-2 (CONCRETE OR ASPHALT) = 151,843 S.F.
DMA 4-3 (ROOFS) = 250,149 S.F.

TOTAL AREA = 406,024 S.F.

MISC. - OTHER DMAs

SELF-TREATING AREA (STA) DMA = 104,426 S.F.

PERMANENT STRUCTURAL BMP

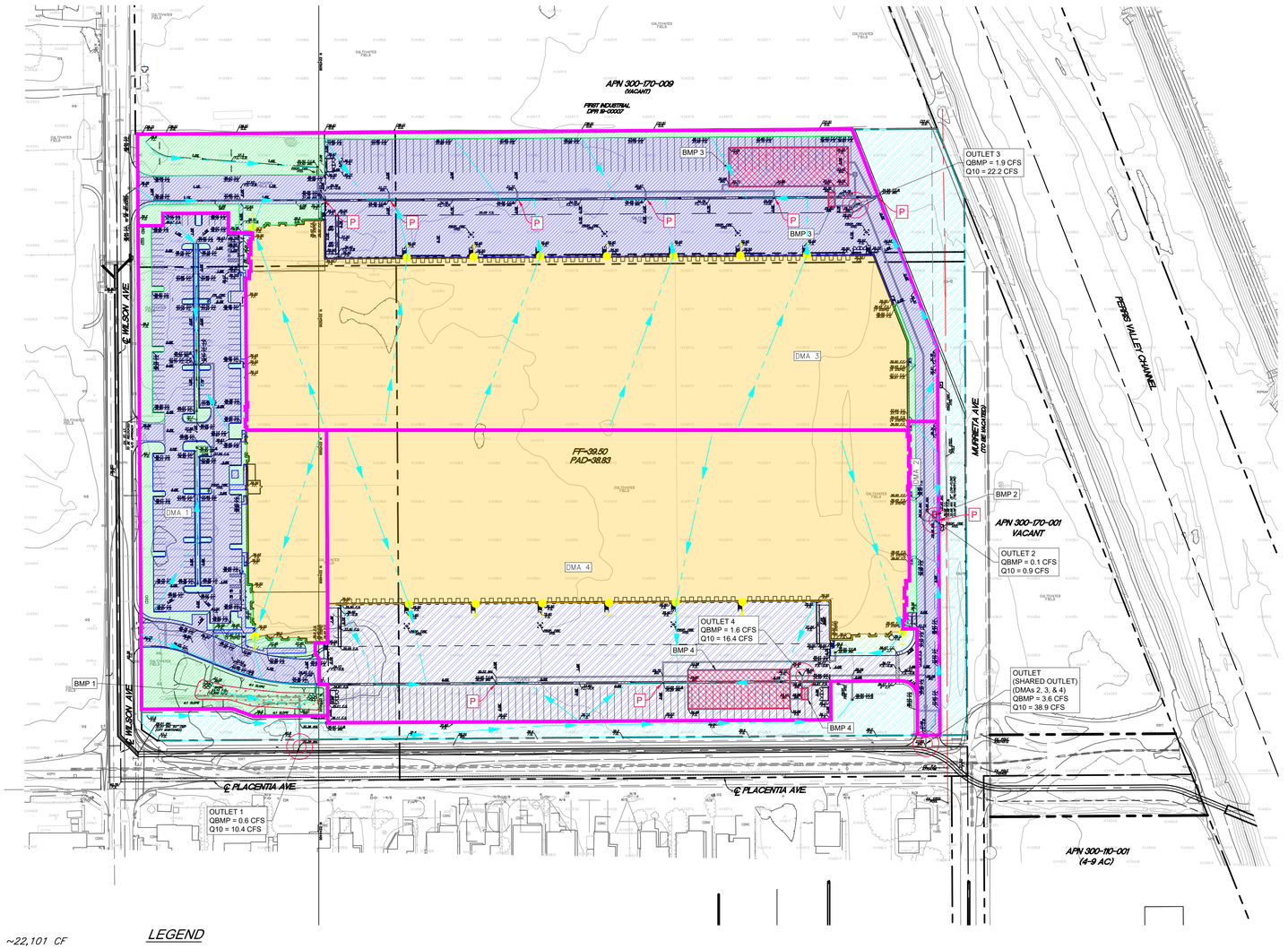
PROPOSED BIORETENTION FACILITY
- BMP 1 (BOTTOM FOOTPRINT PROVIDED): ~4,700 S.F.

PROPOSED CONTECH CMP DETENTION SYSTEM
- BMP 3 (30"-DIAMETER CMP DETENTION SYSTEM); VOL. PROVIDED: ~22,101 CF
- BMP 4 (30"-DIAMETER CMP DETENTION SYSTEM); VOL. PROVIDED: ~18,860 CF

PROPOSED MODULAR WETLAND SYSTEM (MWS)
- BMP 2 (MWS-L-4-8-3'-10"-V-UG; FLOW-BASED); Qt PROVIDED: ~0.115 CFS
- BMP 3 (MWS-L-8-20-3'-6"-V-UG; VOLUME-BASED); VOL. PROVIDED: ~22,001 CF
- BMP 4 (MWS-L-8-16-4'-0"-V-UG; VOLUME-BASED); VOL. PROVIDED: ~18,849 CF

PRE-TREATMENT BMP

PRE-TREATMENT BMP - PROPOSED FLOGARD +PLUS CATCH BASIN INSERT FILTER BY OLDCASTLE INFRASTRUCTURE
- PRE-TREATMENT DEVICE AT SELECT CATCH BASIN LOCATIONS



LEGEND

DRAINAGE MANAGEMENT AREA
SURFACE FLOW PATH
TRACT BOUNDARY
CENTERLINE
CURB AND GUTTER
1280 EXISTING CONTOUR LINE
LOT LINE
SLOPE
ROOF DRAIN LOCATION
DISCHARGE LOCATION (APPROXIMATE)
PROPOSED STORM DRAIN

N

0 50 100 200 300 400
SCALE 1"=100'

REVISED: SEPTEMBER 2023

CITY OF PERRIS
POST-CONSTRUCTION BMP SITE PLAN
LAKE CREEK-PLACENTIA
(CITY CASE NO. P21-00015)

2 OF 3 SHEETS

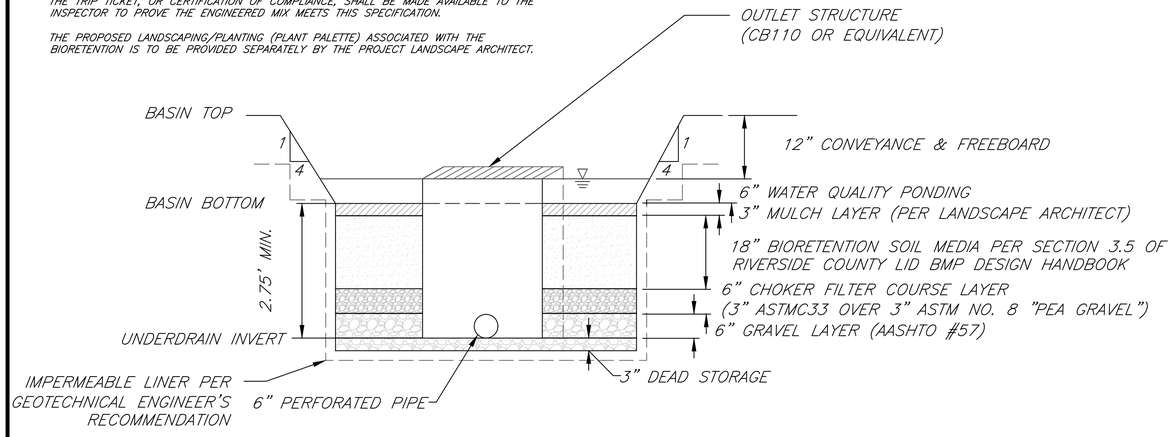
POST-CONSTRUCTION BMP SECTION DETAILS
LAKE CREEK-PLACENTIA

BIORETENTION SOIL MEDIA COMPOSITION – RIVERSIDE COUNTY LID BMP MANUAL SECT. 3.5

COMPONENT	REQUIREMENT
BSM MATERIAL COMPOSITION	MINERAL COMPONENT: 85% BY VOLUME ORGANIC COMPONENT: 15% BY VOLUME
MINERAL COMPONENT	CLASS A SANDY LOAM TOPSOIL COMPRISED OF: SAND: 70–80% BY VOLUME SILT: 15–20% BY VOLUME CLAY: 5–10% BY VOLUME
ORGANIC COMPONENT	NITROGEN STABILIZED COMPOST

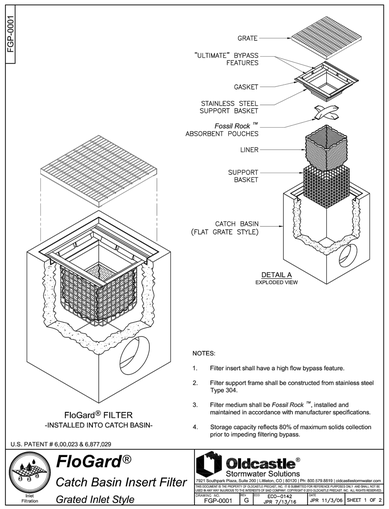
THE TRIP TICKET, OR CERTIFICATION OF COMPLIANCE, SHALL BE MADE AVAILABLE TO THE INSPECTOR TO PROVE THE ENGINEERED MIX MEETS THIS SPECIFICATION.

THE PROPOSED LANDSCAPING/PLANTING (PLANT PALETTE) ASSOCIATED WITH THE BIORETENTION IS TO BE PROVIDED SEPARATELY BY THE PROJECT LANDSCAPE ARCHITECT.



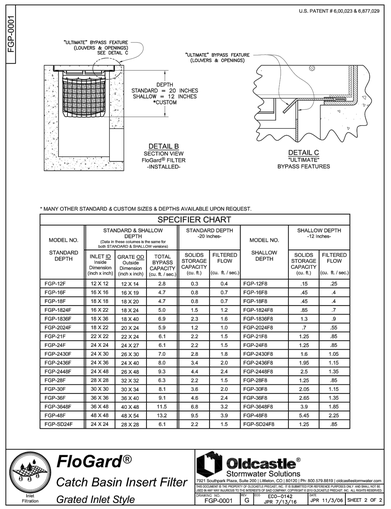
BMP 1 - BIORETENTION FACILITY - TYPICAL SECTION

NOT TO SCALE



PRE-TREATMENT: FLOGARD PLUS CATCH BASIN INSERT FILTER - TYP.

NOT TO SCALE

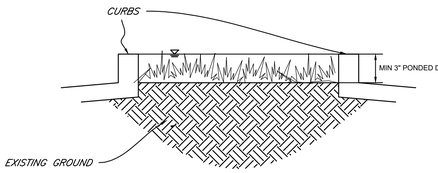


MODEL NO. STANDARD DEPTH	STANDARD & SHALLOW DEPTH (Units in these columns are the same for both STANDARD & SHALLOW versions) INLET (L) Inside Dimension (inch x inch)	GRATE (G) Outside Dimension (inch x inch)	TOTAL BYPASS CAPACITY (cu. ft. / sec.)	STANDARD DEPTH -20 inches- SOLIDS STORAGE CAPACITY (cu. ft.)	FILTERED FLOW (cu. ft. / sec.)	MODEL NO. SHALLOW DEPTH	SHALLOW DEPTH -12 inches- SOLIDS STORAGE CAPACITY (cu. ft.)	FILTERED FLOW (cu. ft. / sec.)
FGP-12F	12 X 12	12 X 14	2.8	0.3	0.4	FGP-12FS	.15	.25
FGP-16F	16 X 16	16 X 19	4.7	0.8	0.7	FGP-16FS	.45	.4
FGP-18F	18 X 18	18 X 20	4.7	0.8	0.7	FGP-18FS	.45	.4
FGP-1824F	18 X 22	18 X 24	5.0	1.5	1.2	FGP-1824FS	.85	.7
FGP-1836F	18 X 36	18 X 40	8.9	2.3	1.8	FGP-1836FS	1.3	.9
FGP-2024F	18 X 22	20 X 24	5.9	1.2	1.0	FGP-2024FS	.7	.55
FGP-21F	22 X 22	22 X 24	6.1	2.2	1.5	FGP-21FS	1.25	.85
FGP-24F	24 X 24	24 X 27	6.1	2.2	1.5	FGP-24FS	1.25	.85
FGP-2436F	24 X 36	26 X 30	7.0	2.8	1.8	FGP-2436FS	1.6	1.05
FGP-2436F	24 X 36	24 X 40	8.0	3.4	2.0	FGP-2436FS	1.95	1.15
FGP-2448F	24 X 48	26 X 48	9.3	4.4	2.4	FGP-2448FS	2.5	1.35
FGP-28F	28 X 28	32 X 32	6.3	2.2	1.5	FGP-28FS	1.25	.85
FGP-30F	30 X 30	30 X 34	8.1	3.6	2.0	FGP-30FS	2.05	1.15
FGP-36F	36 X 36	36 X 40	9.1	4.6	2.4	FGP-36FS	2.65	1.35
FGP-3648F	36 X 48	40 X 48	11.5	6.8	3.2	FGP-3648FS	3.9	1.85
FGP-48F	48 X 48	48 X 54	13.2	9.3	3.9	FGP-48FS	5.45	2.25
FGP-5024F	24 X 24	28 X 28	6.1	2.2	1.5	FGP-5024FS	1.25	.85



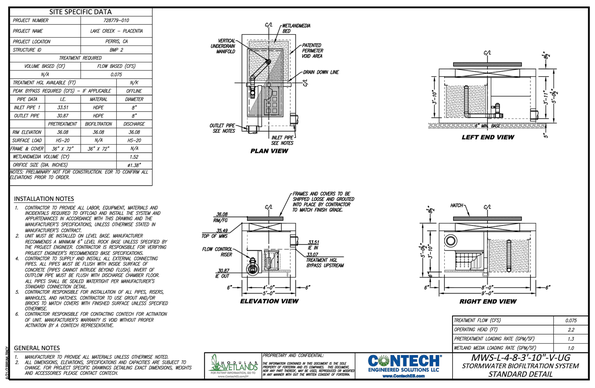
INLET PLACARD DETAIL (TYP.)

NOT TO SCALE



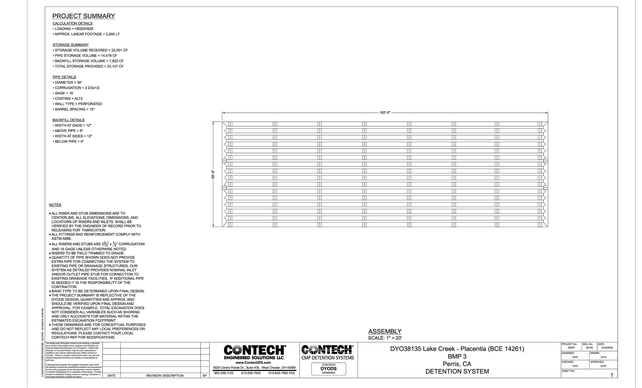
LANDSCAPED ISLAND DETAIL (TYP.)

NOT TO SCALE



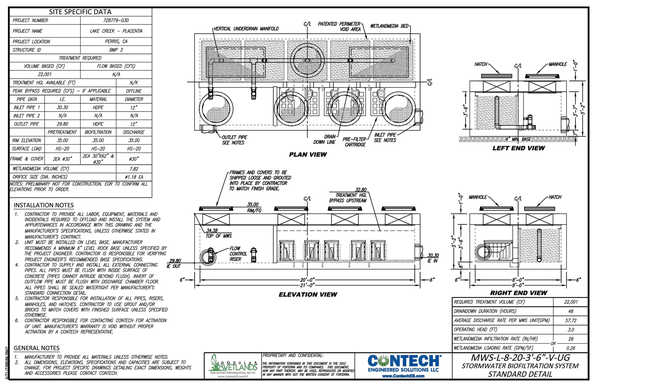
BMP 2 - PROPRIETARY MODULAR WETLAND SYSTEM (MWS-L-4-8-3'-10"-V-UG)

NOT TO SCALE



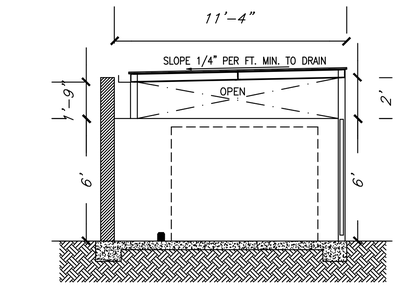
BMP 3 - 30"-DIAMETER CMP DETENTION SYSTEM (CONTECH OR EQUIVALENT) - TYP.

NOT TO SCALE



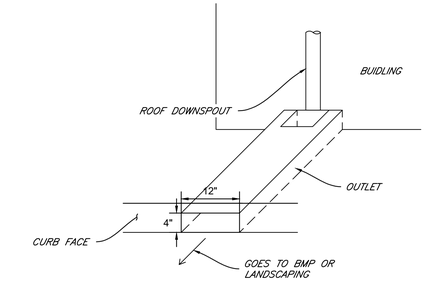
BMP 3 & BMP 4 - CMP DETENTION SYSTEM (CONTECH) - TYPICAL SECTION DETAIL

NOT TO SCALE



TRASH ENCLOSURE STRUCTURE DETAIL (TYP.)

NOT TO SCALE

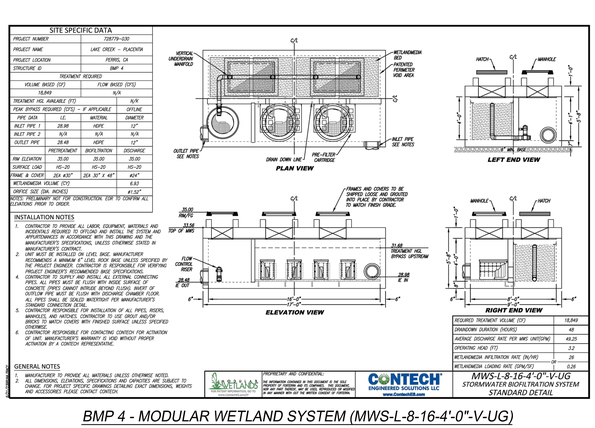


ROOF DRAIN CURB OUTLET STRUCTURE DETAIL (TYP.)

NOT TO SCALE

BMP 4 - 30"-DIAMETER CMP DETENTION SYSTEM (CONTECH OR EQUIVALENT) - TYP.

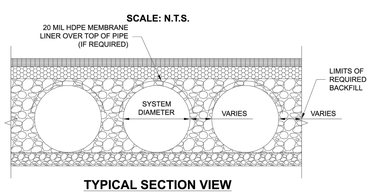
NOT TO SCALE



BMP 4 - MODULAR WETLAND SYSTEM (MWS-L-8-16-4'-0"-V-UG)

NOT TO SCALE

SCALE: N.T.S.



TYPICAL SECTION VIEW

LINER OVER ROWS
SCALE: N.T.S.

REVISED: SEPTEMBER 2023

GENERAL NOTES

1. *TYPICAL SECTION DETAILS FOR THE PROPOSED CONTECH CMP DETENTION PIPES (UNDERGROUND STORAGE FACILITIES) ARE PROVIDED ON THIS SHEET. ALL THE OTHER DETAILS ASSOCIATED WITH THE PROPOSED UNDERGROUND SYSTEM ARE TO BE PROVIDED ON THE FINAL PRECISE GRADING PLAN. ALSO COPIES OF THE DETAILS ARE TO BE PROVIDED AS A SECTION OF THE FINAL WQMP.*
2. *FOR DMA 2, THE PROPOSED MODULAR WETLAND SYSTEM (MWS) IS DESIGNED AS FLOW–BASED. FOR DMA 3 AND DMA 4, THE PROPOSED MWS WILL BE PROVIDED IMMEDIATELY DOWNSTREAM OF THE PROPOSED UNDERGROUND STORAGE FACILITY AND HAS BEEN SIZED USING THE VOLUME–BASED APPROACH.*

CITY OF PERRIS	
POST-CONSTRUCTION BMP SECTION DETAILS LAKE CREEK-PLACENTIA (CITY CASE NO. P21-00015)	3 OF 3 SHEETS

Appendix 2: Construction Plans

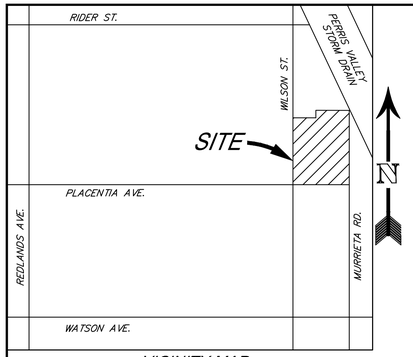
Grading and Drainage Plans

Note: Preliminary site plans are included.

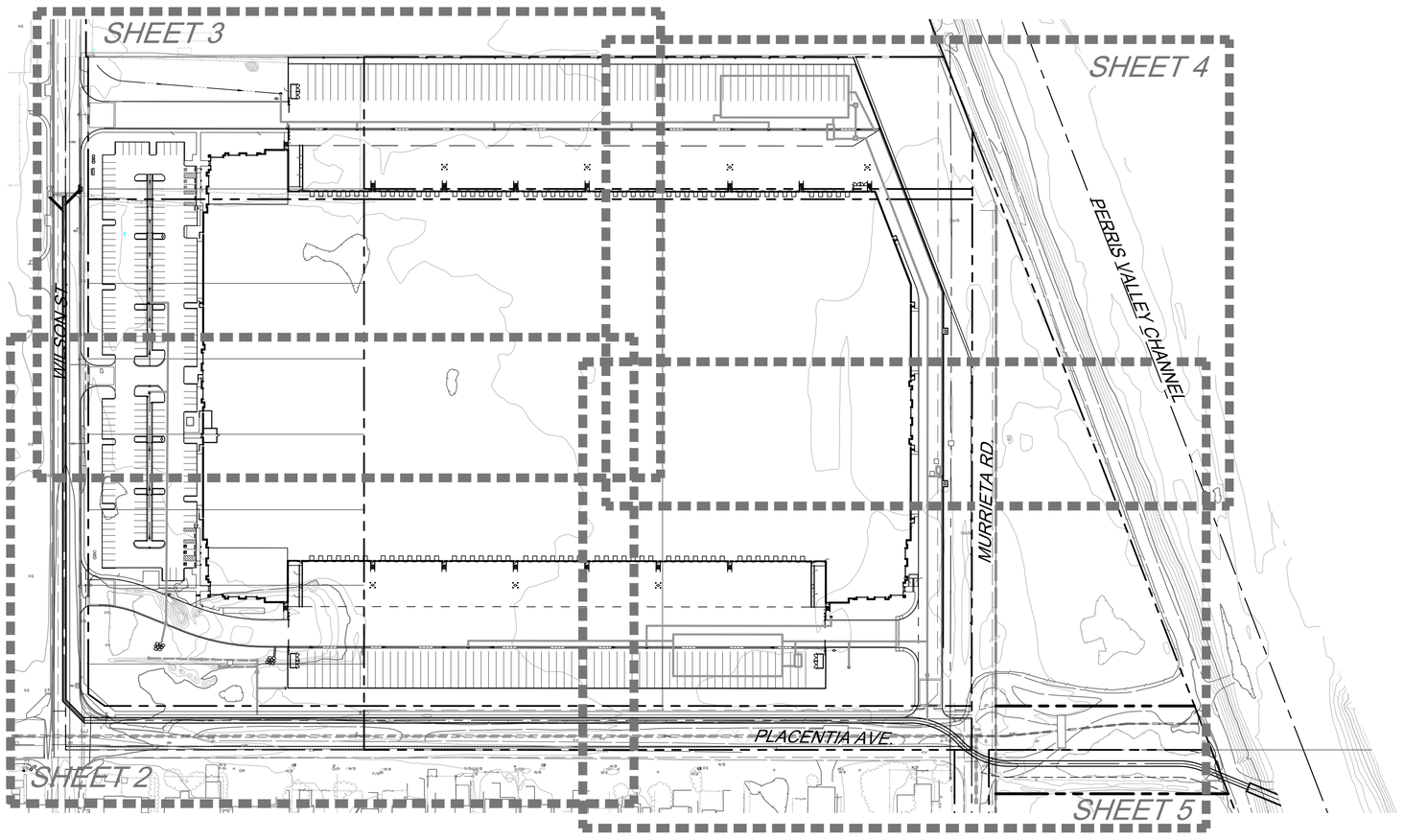
IN THE CITY PERRIS, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA.

PRELIMINARY GRADING PLAN

SEPTEMBER 2023



VICINITY MAP
NOT TO SCALE



OWNER/APPLICANT

LAKE CREEK INDUSTRIAL, LLC
1302 BRITTANY CROSS CIRCLE
SANTA ANA, CA 90705
PHONE: (949) 910-4616

SHEET INDEX

SHEET 1: TITLE SHEET
SHEET 2-5: PRELIMINARY GRADING PLAN
SHEET 6: SECTIONS AND DETAILS

ENGINEER

SDH & ASSOCIATES, INC
27363 VIA INDUSTRIA
TEMECULA, CA 92590
VOICE: (951) 683-3691
FAX: (951) 788-2314

ARCHITECT

RGA
15231 ALTON PARKWAY
SUITE 100
IRVINE, CA 92618
TEL: (949) 341-0920

TOPOGRAPHY SOURCE

AERIAL PHOTOGRAMMETRY PERFORMED BY:
ARROWHEAD MAPPING
PHONE- (909) 889-2420

PROJECT DATA

GROSS SITE AREA: 1,216,080 S.F. (27.9 AC.)
NET SITE AREA: 1,187,652 S.F. (27.3 AC.)
BUILDING AREA: 580,900 S.F.

APN:

300-170-003
300-170-004
300-170-005
300-170-006
300-170-010
300-170-011
300-170-012
300-170-013
300-170-014
300-170-015
300-170-016
300-170-017

BASIS OF BEARINGS

THE BEARINGS SHOWN HEREON ARE BASED ON THE CENTERLINE OF PLACENTIA AVENUE PER PARCEL MAP NO. 31743. PMB 210/43-44
BEING NORTH 89°36'05" EAST

ZONING

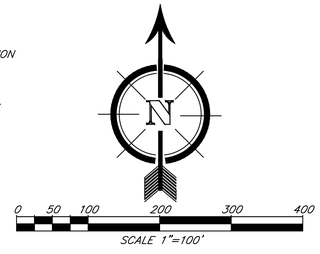
EXISTING ZONING: LIGHT INDUSTRIAL
PROPOSED ZONING: LIGHT INDUSTRIAL

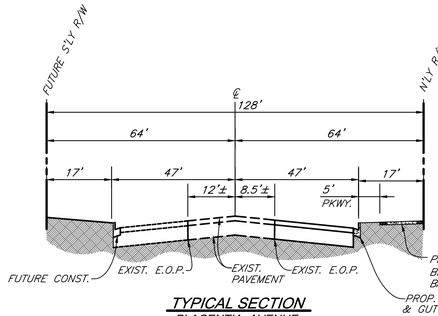
LEGEND

T.C.B. - TOP CATCH BASIN
F.G. - FINISHED GRADE
F.L. - FLOW LINE
H.P. - HIGH POINT
EXIST. - EXISTING
P.E. - PAD ELEVATION
G.B. - GRADE BREAK
- STEM WALL HEIGHT
- TRACT BOUNDARY
- CENTERLINE
- CURB AND GUTTER
1280 - EXISTING CONTOUR LINE
- LOT LINE
- SLOPE

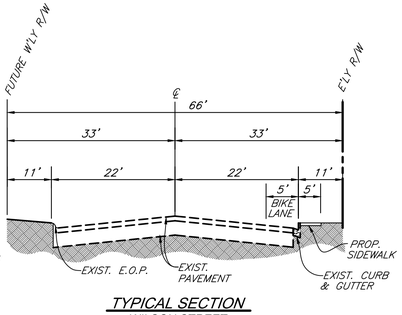
CONSTRUCTION NOTES

1. CONSTRUCT 3" A.C. OVER 4" A.B. PAVEMENT DRIVE AND PARKING AREAS
2. CONSTRUCT 6" CURB ONLY PER DETAIL ON SHEET 6
3. CONSTRUCT 6" CURB & GUTTER PER DETAIL ON SHEET 6
4. CONSTRUCT 3' WIDE RIBBON GUTTER PER DETAIL ON SHEET 6
5. INSTALL 24" BROOKS CATCH BASIN 2424CB WITH TRAFFIC GRATE OR APP'D EQUAL
6. CONSTRUCT 12" ATRIUM GRATE LANDSCAPE CATCH BASIN
7. INSTALL 5'X5' RIPRAP PAD, d50=12" STONE, EMBEDDED 6" UNDERLAIN WITH NON-WOVEN GEOTEXTILE FILTER FABRIC
8. INSTALL FLOGARD+CATCH BASIN FILTER MODEL NO. FGP-24F
9. 12" GAP IN CURB FOR DRAINAGE CONVEYANCE
10. CONSTRUCT COMMERCIAL DWY APPROACH
11. CONSTRUCT OFFSITE A.C. OVER A.B. PAVING
12. CONSTRUCT OFFSITE 6" CURB & GUTTER
13. CONSTRUCT WALKWAY/HARDSCAPE
14. CONSTRUCT 2' WIDE 1' DEEP BROW DITCH
15. CONSTRUCT PARKWAY DRAIN
16. CONSTRUCT P.C.C. CONCRETE PAVING TRUCK COURT
17. CONSTRUCT HANDICAP RAMP
18. INSTALL MODULAR WETLAND SYSTEM MWS-L-8-20
19. 24" GAP IN CURB FOR DRAINAGE CONVEYANCE
20. CONSTRUCT RETAINING WALL (PER SEPARATE PERMIT)
21. CONSTRUCT FLOOD CONTROL LINE H STORM DRAIN FACILITY (PER SEPARATE PERMIT)
22. PROP. 5' WIDE BIKE LANE W/ 6" SOLID LANE STRIPE PER CALTRANS REV. STD. PLANS, PLAN NO. A200, DETAIL 39
23. CONSTRUCT PCC SIDEWALK PER CITY STD. IN R/W
24. INSTALL 8" HPDE STORM DRAIN PIPE
25. INSTALL 12" HPDE STORM DRAIN PIPE
26. INSTALL 18" HPDE STORM DRAIN PIPE
27. INSTALL 24" HPDE STORM DRAIN PIPE
28. INSTALL 30" HPDE STORM DRAIN PIPE
29. INSTALL 36" HPDE STORM DRAIN PIPE
30. INSTALL 42" HPDE STORM DRAIN PIPE
31. INSTALL 36" BROOKS CATCH BASIN 3636CB WITH SOLID GRATE OR APP'D EQUAL
32. INSTALL 36" BROOKS CATCH BASIN 3636CB WITH TRAFFIC GRATE OR APP'D EQUAL
33. INSTALL FLOGARD + CATCH BASIN FILTER MODEL NO.FGP-36F
34. CONSTRUCT UNDERGROUND CONTECH 30" DIAMETER CMP DETENTION PIPES
35. INSTALL 6" P.V.C. SUBDRAIN PIPE FOR BIORETENTION
36. INSTALL STORM DRAIN CLEANOUT PORT (FOR MAINTENANCE PURPOSE)
37. INSTALL MODULAR WETLAND SYSTEM MWS-L-8-16
38. INSTALL 24" R.C.P. STORM DRAIN
39. INSTALL 48" R.C.P. STORM DRAIN
40. INSTALL MODULAR WETLAND SYSTEM MWS-L-4-8
41. INSTALL 2-12" HDPEs STORM DRAIN
42. CONSTRUCT BIORETENTION FACILITY





TYPICAL SECTION
PLACENTIA AVENUE
INDUSTRIAL COLLECTOR
NOT TO SCALE



TYPICAL SECTION
WILSON STREET
INDUSTRIAL COLLECTOR
NOT TO SCALE

LEGAL DESCRIPTION

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF PERRIS, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

PARCEL 2, AS SHOWN BY PARCEL MAP 6132, ON FILE IN BOOK 15 PAGE 69 OF PARCEL MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA;

EXCEPTING THEREFROM THAT PORTION CONVEYED TO THE CITY OF PERRIS BY DOCUMENT RECORDED MARCH 4, 1988 AS INSTRUMENT NO. 57919 OF OFFICIAL RECORDS OF RIVERSIDE COUNTY, CALIFORNIA DESCRIBED AS FOLLOWS:

THAT PORTION OF PARCELS 1, 2, AND 3 OF PARCEL MAP NO. 6132 AS SHOWN BY PARCEL MAP ON FILE IN BOOK 15 PAGE 69, OF PARCEL MAPS RECORDS OF RIVERSIDE COUNTY, CALIFORNIA, DESCRIBED AS FOLLOWS:

A STRIP OF LAND 15.00 FEET WIDE, THE CENTER LINE OF SAID STRIP BEING DESCRIBED AS FOLLOWS:
COMMENCING AT THE SOUTHWEST CORNER OF SAID PARCEL 1, SAID SOUTHWEST CORNER BEING ALSO THE CENTER LINE INTERSECTION OF PLACENTIA AVENUE AND WILSON AVENUE (SHOWN AS WILSON STREET ON SAID PARCEL MAP 6132);
THENCE NORTH 0 DEGREES 24' 54" WEST ALONG THE WEST LINE OF SAID PARCEL 1, BEING ALSO ALONG SAID CENTER LINE OF WILSON AVENUE, A DISTANCE OF 810.00 FEET TO THE TRUE POINT OF BEGINNING;
THENCE NORTH 99 DEGREES 35' 58" EAST, PARALLEL WITH SAID CENTER LINE OF PLACENTIA AVENUE, A DISTANCE OF 1321.17 FEET TO THE EAST LINE OF SAID PARCEL MAP NO. 6132, THE EASTERLY TERMINUS OF SAID STRIP;

EXCEPTING THEREFROM THOSE PORTIONS LYING WITHIN PARCELS 1 AND 3 OF SAID PARCEL MAP 6132.

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF PERRIS, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

PARCEL 3 AS SHOWN BY PARCEL MAP 6132, ON FILE IN BOOK 15 PAGE 69, OF PARCEL MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA;

EXCEPTING THEREFROM THAT PORTION CONVEYED TO THE CITY OF PERRIS IN DOCUMENT RECORDED MARCH 4,
1988 AS INSTRUMENT NO. 57919 OF OFFICIAL RECORDS OF RIVERSIDE COUNTY, CALIFORNIA, DESCRIBED AS
FOLLOWS:

THAT PORTION OF PARCEL 3 OF PARCEL MAP NO. 6132 AS SHOWN BY MAP ON FILE IN BOOK 15 PAGE 69 OF PARCEL MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA, DESCRIBED AS FOLLOWS:
A STRIP OF LAND 15.00 FEET WIDE, THE CENTER LINE OF SAID STRIP BEING DESCRIBED AS FOLLOWS:
COMMENCING AT THE SOUTHWEST CORNER OF PARCEL 1, OF SAID MAP, SAID SOUTHWEST CORNER ALSO BEING THE CENTER LINE INTERSECTION OF PLACENTIA AVENUE AND WILSON AVENUE (SHOWN AS WILSON STREET OF SAID PARCEL MAP NO. 6132);

THENCE NORTH 0 DEGREES 24' 54" WEST ALONG THE WEST LINE OF SAID PARCEL 1, BEING ALSO ALONG SAID CENTER LINE OF WILSON AVENUE, A DISTANCE OF 810.00 FEET TO THE TRUE POINT OF BEGINNING;
THENCE NORTH 99 DEGREES 35' 58" EAST, PARALLEL WITH SAID CENTER LINE OF PLACENTIA AVENUE, A DISTANCE OF 1321.17 FEET TO THE EAST LINE OF SAID PARCEL MAP NO. 5132, THE EASTERLY TERMINUS OF SAID STRIP.

FOR CONVEYANCING PURPOSES ONLY: APN 300-170-005 (AFFECTS: PORTION OF SAID LAND)
APN 300-170-006 (AFFECTS: PORTION OF SAID LAND)

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF PERRIS, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

PARCELS 3, 4, 5, 6, 7, & C OF PARCEL MAP NO. 31743, IN THE CITY OF PERRIS, AS SHOWN BY MAP ON FILE IN BOOK 210, PAGE(S) 43 AND 44 OF PARCEL MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF RIVERSIDE COUNTY, CALIFORNIA.

FOR CONVEYANCING PURPOSES ONLY: APNS
300-170-010 (AFFECTS PARCEL 1)
300-170-011 (AFFECTS PARCEL 2)
300-170-012 (AFFECTS PARCEL 3)
300-170-013 (AFFECTS PARCEL 4)
300-170-014 (AFFECTS PARCEL 5)
300-170-015 (AFFECTS PARCEL 6)
300-170-016 (AFFECTS PARCEL 7)
300-017-017 (AFFECTS PARCEL C)

PRELIMINARY
NOT FOR CONSTRUCTION

REVISIONS

MARK	DESCRIPTION	BY	APPR	DATE

DESIGNED BY: S.S. DRAWN BY: X.O.F.
CHECKED BY: D.A.S. PROJECT MANAGER: S.S.

PLANNING DIVISION: DATE:

PREPARED BY: DATE:

DANE SOMMERS
R.C.E. NO.: 90433 EXP. 9-30-25

SEAL: REGISTERED PROFESSIONAL ENGINEER — DANE A. SOMMERS — No. 90433 Exp. 9-30-25 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
SDH & ASSOCIATES INCORPORATED
SDH AND ASSOCIATES INC.
27363 VIA INDUSTRIA
TEMECULA, CA 92590
TEL: (951) 683-3691 FAX (951) 788-2314

SCALE: 1"=100'

DATE: SEPTEMBER 2025

BENCHMARK
NGS DESIGNATION NO. 431 PID: DX5438 RIVERSIDE COUNTY, CALIFORNIA
ELEVATION = 1,441.70' NAVD '88
DESCRIPTION: AT THE NORTHEAST CORNER OF RIDER ST AND WILSON AVE, 57 FEET (17.4 M) EAST OF CENTERLINE OF WILSON PRODUCED AND 35.2 FEET (10.7 M) NORTH OF RIDER ST; A 4 FOOT (1.2 M) DIAMETER CONCRETE BASE OF A STEEL EDISON POWER POLE : A 3-1/4 INCH STANDARD NMDSC ALUMINUM DX5438"DISK SET ON SOUTHSIDE FLUSH.

CITY OF PERRIS
LAKE CREEK - PLACENTIA
PRELIMINARY GRADING PLAN
TITLE SHEET

1 OF 6 SHEETS

FOR: W.O. CITY FILE NO.

SEE SHEET 3

FF=39.50
PAD=38.83

SEE SHEET 5

EX. PARCEL LINES (TYP.)

EX. PARCEL LINES (TYP.)

PROP. 54" S.D.

EX. 8" WAT. (D-4488)
19' W/O ℄

EX. ST. LT. TO BE RELOCATED N/O APPROACH

EX. ST. LT. TO BE RELOCATED N/O APPROACH

LANDSCAPE

EX. R/W

EX. CURB & GUTTER

EX. CURB & GUTTER

℄ WILSON ST.

PROP. FIRE HYD.

PROP. FIRE HYD.

PROP. FIRE HYD.

PROP. FIRE HYD.

BASIN
33.16 F.G.
(12,500 S.F.)

4:1 SLOPE

4:1 SLOPE

4:1 SLOPE

PROP. TRASH ENCLOSURE PER ARCH. PLANS

GRADE BREAK LINE

35.05 F.S.-G.B.

EX. 54" CMP (CITY MAINTAINED)

EX. R/W

EX. 12" SEWER 6' E/O ℄ (SD-4149)

EX. 8" SEWER 6' N/O ℄ (0-26295)

PROP. LINE H IMPROVEMENTS @ 0.25% +/-

EX. EDGE OF PAVEMENT

EX. EDGE OF PAVEMENT

℄ PLACENTIA AVE.

N

0 15 30 60 90 120

SCALE 1"=30'

PRELIMINARY
NOT FOR CONSTRUCTION

REVISIONS				
MARK	DESCRIPTION	BY	APPR	DATE

DESIGNED BY: S.S. | DRAWN BY: X.O.F.
CHECKED BY: D.A.S. | PROJECT MANAGER: S.S.

PLANNING DIVISION: DATE:

PREPARED BY: DATE:

DANE SOMMERS
R.C.E. NO.: 90433 EXP. 9-30-25

SEAL: REGISTERED PROFESSIONAL ENGINEER — DANE A. SOMMERS — No. 90433 Exp. 9-30-25 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:

SDH & ASSOCIATES INCORPORATED
SDH AND ASSOCIATES INC.
27363 VIA INDUSTRIA
TEMECULA, CA 92590
TEL: (951) 683-3691 FAX (951) 788-2314

SCALE: 1"=30'

DATE: SEPTEMBER 2025

BENCHMARK
NGS DESIGNATION NO. 431 PID: DX5438 RIVERSIDE COUNTY, CALIFORNIA
ELEVATION = 1,441.70' NAVD '88
DESCRIPTION: AT THE NORTHEAST CORNER OF RIDER ST AND WILSON AVE, 57 FEET (17.4 M) EAST OF CENTERLINE OF WILSON PRODUCED AND 35.2 FEET (10.7 M) NORTH OF RIDER ST, A 4 FOOT (1.2 M) DIAMETER CONCRETE BASE OF A STEEL EDISON POWER POLE , A 3-1/4 INCH STANDARD NMDSC ALUMINUM DX5438TDSK SET ON SOUTHSIDE FLUSH.

CITY OF PERRIS
LAKE CREEK - PLACENTIA
PRELIMINARY GRADING PLAN

2 OF 6 SHEETS

FOR: | W.O. | CITY FILE NO.

APN 300-170-009
(VACANT)

FIRST INDUSTRIAL
DPR 19-00007

B

EX. 12" SEWER
6' E/O ℄
(SD-4149)

EX. 8" WAT. (D-4486)
15' W/O ℄

EX. ST. LIGHT
TO BE RELOCATED

℄ WILSON ST.

PROP. 54" S.D.

EX. CURB & GUTTER

PROP. R/W

EX. ST. LT.
TO BE RELOCATED
W/O APPROACH

PROP. CATCH BASIN

PR. FIRE HYD.

PROP. TRASH ENCLOSURE PER ARCH. PLANS

PROP. FIRE HYD.

FENCING (PER ARCH PLANS)

GRADE BREAK LINE

EX. PARCEL LINES (TYP.)

N89°36'04"E 1280.03'

N0°24'37"W

166.5'

VARIES 20'-20.8

19' 28' 19' 6' 19' 28' 19' 8.5

95'

66'

24'

40'

33'

22' 11'

5'

FF=39.50
PAD=38.83

SEE SHEET 2

SEE SHEET 4

0 15 30 60 90 120
SCALE 1"=30'

PRELIMINARY
NOT FOR CONSTRUCTION

REVISIONS				
MARK	DESCRIPTION	BY	APPR	DATE

DESIGNED BY: S.S. DRAWN BY: S.J.S.
CHECKED BY: D.A.S. PROJECT MANAGER: S.S.

PLANNING DIVISION: DATE:

PREPARED BY: DATE:

DANE SOMMERS
R.C.E. NO.: 90433 EXP. 9-30-25

SEAL: REGISTERED PROFESSIONAL ENGINEER — DANE A. SOMMERS — No. 90433 Exp. 9-30-25 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:

SDH & ASSOCIATES INCORPORATED
SDH AND ASSOCIATES INC.
27363 VIA INDUSTRIA
TEMECULA, CA 92590
TEL: (951) 683-3691 FAX (951) 788-2314

SCALE: 1"=30'

SEPTEMBER 2025

BENCHMARK
NGS DESIGNATION NO. 431 PID: DX5438 RIVERSIDE COUNTY, CALIFORNIA
ELEVATION = 1,441.70' NAVD '88
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CITY OF PERRIS
LAKE CREEK - PLACENTIA
PRELIMINARY GRADING PLAN

3 OF 6 SHEETS

FOR: W.O. CITY FILE NO.

APN 300-170-009
(VACANT)

FIRST INDUSTRIAL
DPR 19-00007

B

N89°36'04"E 1280.03'

(38.0) O.C.

(37.5) O.C.

FENCING (PER ARCH PLANS)

(37.5) O.C.

(37.4) O.C.

EX. STEEL POLE

38.15 T.C.
37.65 F.S.

37.65 T.C.
37.15 F.S.

38.15 T.C.
37.65 F.S.

37.65 T.C.
37.15 F.S.

37.23 T.C.
36.73 F.S.

37.13 T.C.
36.63 F.S.

PROP. 14' SCREENWALL

37.04 F.S.

36.33 F.S.

CONTECH CMP DETENTION
SYSTEM INVERT=30.40 INV. (PIPE)

NO GRADING PROPOSED

95'

3.0%

2.0%

33.40 INV.

30.69 INV.

35.21 F.S.

34.86 F.S.

30.40 INV.

35.09 F.S.

31.37 INV.

30.97 INV.

34.52 T.C.B
31.52 INV.

125' FUTURE RCFC ESMT

30.30 INV.

34.79 F.L.-H.P.

34.79 F.L.-H.P.

34.29 T.C.B
31.79 INV.

34.79 F.L.-H.P.

34.29 T.C.B

29.80 INV.

29.73 INV.

35.05 F.S.

24'

0.7%

3.0%

GRADE BREAK LINE

0.5%

PROP. FIRE HYD.

PROP. FIRE HYD.

PROP. FIRE HYD.

66'

PROP. TRASH ENCLOSURE PER ARCH. PLANS

35.40 F.S.

35.40 F.S.

35.40 F.S.

35.40 F.S.

35.40 F.S.

35.50 F.S.

35.50 F.S.

35.50 F.S.

35.42 F.S.

35.72 F.S.

34.92 F.L.

1.9%

EX. MURRIETA AVE ROAD WAY ESMT (NOT IMPROVED)

EX. PERRIS VALLEY CHANNEL W'LY R/W

39.50 F.F.

39.45 F.S.
(7 STEPS)

36.50 T.C.
36.00 F.S.

2.0%

36.50 F.L.

33'

2.0%

EX. MURRIETA AVE. EASEMENT (TO BE VACATED)

EX. PARCEL LINES (TYP.)

39.50 F.F.

39.45 F.S.
(5 STEPS)

37.11 T.C.
36.61 F.S.

35.78 F.L.-H.P.

35.91 F.L.

PROP. R/W

EX. 50' WIDE SCE ESMT
INST. NO. 1952-1417-246-#49647

EX. 36" WATER (D-954)

37.64 T.C.
37.14 F.S.

39.45 F.S.
(4 STEPS)

39.50 F.F.

35.34 F.L.-H.P.

2.0%

PROP. FIRE HYD.

EX. STEEL POLE

MURRIETA AVE.
(TO BE VACATED)

PERRIS VALLEY CHANNEL

SEE SHEET 3

SEE SHEET 5

FF=39.50
PAD=38.83

N

0 15 30 60 90 120

SCALE 1"=30'

PRELIMINARY
NOT FOR CONSTRUCTION

REVISIONS				
MARK	DESCRIPTION	BY	APPR	DATE

DESIGNED BY: S.S. DRAWN BY: S.J.S.
CHECKED BY: D.A.S. PROJECT MANAGER: S.S.

PLANNING DIVISION: DATE:

PREPARED BY: DATE:

DANE SOMMERS
R.C.E. NO.: 90433 EXP. 9-30-25

SEAL:

REGISTERED PROFESSIONAL ENGINEER
DANE A. SOMMERS
No. 90433
Exp. 9-30-25
CIVIL
STATE OF CALIFORNIA

PREPARED BY:

SDH & ASSOCIATES INCORPORATED
SDH AND ASSOCIATES INC.
27363 VIA INDUSTRIA
TEMECULA, CA 92590
TEL: (951) 683-3691 FAX (951) 788-2314

SCALE: 1" =30'

DATE: SEPTEMBER 2025

BENCHMARK
NGS DESIGNATION NO. 431 PID: DX5438 RIVERSIDE COUNTY, CALIFORNIA
ELEVATION = 1,441.70' NAVD '88
DESCRIPTION: AT THE NORTHEAST CORNER OF RIDER ST AND WILSON AVE, 57 FEET (17.4 M) EAST OF CENTERLINE OF WILSON PRODUCED AND 35.2 FEET (10.7 M) NORTH OF RIDER ST; A 4 FOOT (1.2 M) DIAMETER CONCRETE BASE OF A STEEL EDISON POWER POLE : A 3-1/4 INCH STANDARD NMDSC ALUMINUM DX5438"DISK SET ON SOUTHSIDE FLUSH.

CITY OF PERRIS
LAKE CREEK - PLACENTIA
PRELIMINARY GRADING PLAN

4 OF 6 SHEETS

FOR: W.O. CITY FILE NO.

FF=39.50
PAD=38.83

SEE SHEET 4

SEE SHEET 2

APN 300-170-001
VACANT

EX. PARCEL LINES (TYP.)

GRADE BREAK LINE

CONTECH CMP STORAGE SYSTEM INVERT 29.10 INV.

PROP. TRASH ENCLOSURE PER ARCH. PLANS

PROP. FIRE HYD.

PROP. CURB & GUTTER

PROP. LINE H IMPROVEMENTS @ 0.25% +/-

PROP. S/W

EX. EDGE OF PAVEMENT

℄ PLACENTIA AVE.

EX. 8" WATER (D-9190) 11' S/O ℄

EX. 24" SEWER 20' N/O ℄ (SD-15246)

EX. BLOW OFF TO BE RELOCATED
EX. WATER APPURTENANCE TO BE RELOCATED

EX. P.P. 4770478E

EX. STEEL POLE 4602571E

EX. POLE 4507451E

EX. POLE 145405

EX. 27" SEWER 20' N/O ℄ (D-24616)

EX. MURRIETA AVE. EASEMENT (TO BE VACATED) EX. 50' WIDE SCE ESMT INST. NO. 1952-1412-246-#49647

EX. 36" WATER LD-954

PROP. 14' SCREENWALL

FENCING (PER ARCH PLANS)

EX. STEEL POLE

EX. STEEL POOL

EX. 8" WAT. 11' W/O℄

PROP. 40' OFFSITE STORM DRAIN ESMT

PROJECTED PLACENTIA AVE. ℄

END CHANNEL-BEGIN 42" CMP @ 0.2% (CITY MAINTAINED)

S.C.E. ACCESS

ULTIMATE R/W

A

B

N

0 15 30 60 90 120
SCALE 1"=30'

PRELIMINARY
NOT FOR CONSTRUCTION

REVISIONS				
MARK	DESCRIPTION	BY	APPR	DATE

DESIGNED BY: S.S. | DRAWN BY: S.J.S.
CHECKED BY: D.A.S. | PROJECT MANAGER: S.S.

PLANNING DIVISION: DATE:

PREPARED BY: DATE:
DANE SOMMERS
R.C.E. NO.: 90433 EXP. 9-30-25

SEAL: REGISTERED PROFESSIONAL ENGINEER — DANE A. SOMMERS — No. 90433 Exp. 9-30-25 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:
SDH AND ASSOCIATES INC.
27363 VIA INDUSTRIA
TEMECULA, CA 92590
TEL: (951) 683-3691 FAX (951) 788-2314

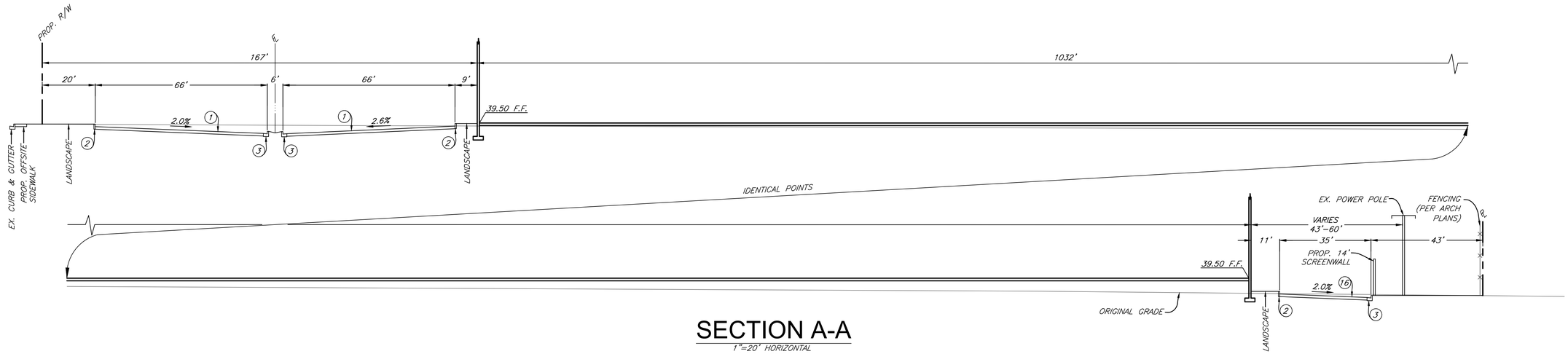
SCALE: 1"=30'
DATE: SEPTEMBER 2025

BENCHMARK
NGS DESIGNATION NO. 431 PID: DX5438 RIVERSIDE COUNTY, CALIFORNIA
ELEVATION = 1,441.70' NAVD '88
DESCRIPTION: AT THE NORTHEAST CORNER OF RIDER ST AND WILSON AVE, 57 FEET (17.4 M) EAST OF CENTERLINE OF WILSON PRODUCED AND 35.2 FEET (10.7 M) NORTH OF RIDER ST, A 4 FOOT (1.2 M) DIAMETER CONCRETE BASE OF A STEEL EDISON POWER POLE . A 3-1/4 INCH STANDARD NMDSC ALUMINUM DX5438TDSK SET ON SOUTHSIDE FLUSH.

CITY OF PERRIS
LAKE CREEK - PLACENTIA
PRELIMINARY GRADING PLAN

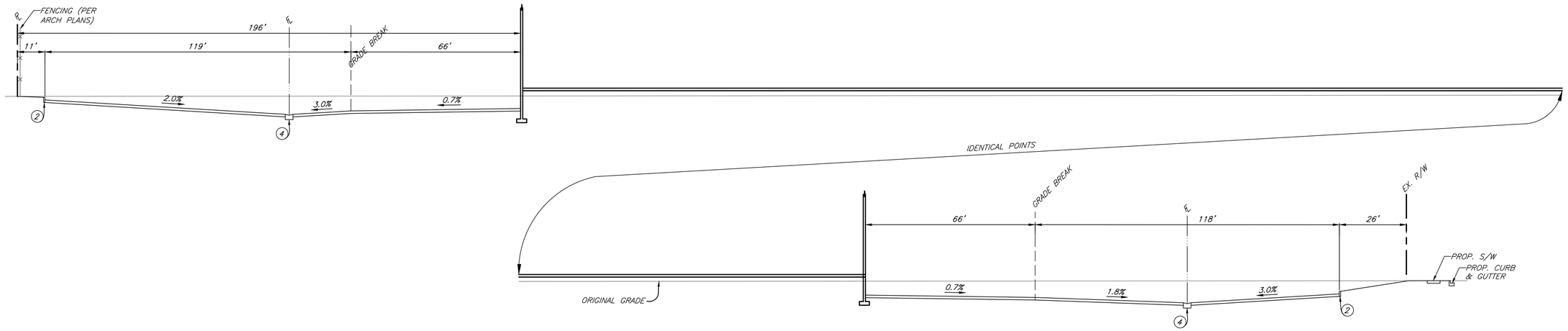
5 OF 6 SHEETS

FOR: | W.O. | CITY FILE NO.



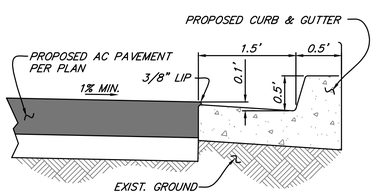
SECTION A-A

1"=20' HORIZONTAL
1"=10' VERTICAL



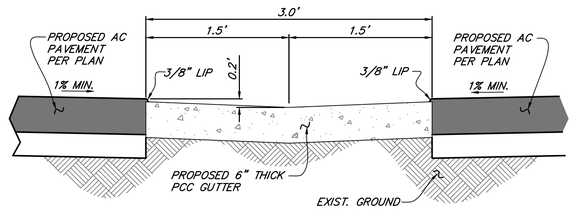
SECTION B-B

1"=20' HORIZONTAL
1"=10' VERTICAL



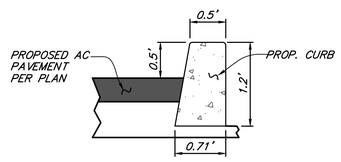
CURB & GUTTER

NO SCALE



RIBBON GUTTER

NO SCALE



CURB ONLY

NO SCALE

PRELIMINARY
NOT FOR CONSTRUCTION

REVISIONS

MARK	DESCRIPTION	BY	APPR	DATE

DESIGNED BY: S.S. | DRAWN BY: S.J.S.
CHECKED BY: D.A.S. | PROJECT MANAGER: S.S.

PLANNING DIVISION: DATE:

PREPARED BY: DATE:

DANE SOMMERS
R.C.E. NO.: 90433 EXP. 9-30-23

SEAL: REGISTERED PROFESSIONAL ENGINEER — DANE A. SOMMERS — No. 90433 — Exp. 9-30-23 — CIVIL — STATE OF CALIFORNIA

PREPARED BY:

SDH & ASSOCIATES INCORPORATED
SDH AND ASSOCIATES INC.
27363 VIA INDUSTRIA
TEMECULA, CA 92590
TEL: (951) 683-3691 FAX (951) 788-2314

SCALE: 1"=40'

DATE: APRIL 2023

BENCHMARK
NGS DESIGNATION NO. 431 PID: DX5438 RIVERSIDE COUNTY, CALIFORNIA
ELEVATION = 1,441.70' NAVD '88
DESCRIPTION: AT THE NORTHEAST CORNER OF RIDER ST AND WILSON AVE, 57 FEET (17.4 M) EAST OF CENTERLINE OF WILSON PRODUCED AND 35.2 FEET (10.7 M) NORTH OF RIDER ST, A 4 FOOT (1.2 M) DIAMETER CONCRETE BASE OF A STEEL EDISON POWER POLE . A 3-1/4 INCH STANDARD NMDSC ALUMINUM DX5438"DISK SET ON SOUTHSIDE FLUSH.

CITY OF PERRIS
LAKE CREEK - PLACENTIA
PRELIMINARY GRADING PLAN
SECTIONS AND DETAILS

6 OF 6 SHEETS

FOR: | W.O. | CITY FILE NO.

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

April 19, 2021

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Lake Creek Industrial, LLC
1302 Brittany Cross Road
Santa Ana, California 92705

Attention: Mr. Bob Kubichek
Senior Vice President

Project No.: **21G147-2**

Subject: **Results of Infiltration Testing**
Proposed Warehouse
NWC Placentia Avenue at Murrieta Road
Perris, California

Reference: Geotechnical Investigation, Proposed Warehouse, NWC Placentia Avenue at Murrieta Road, Perris, California, prepared for Lake Creek Industrial, LLC, by Southern California Geotechnical, Inc. (SCG), SCG Project No. 21G147-1, dated April 16, 2021.

Mr. Kubichek:

In accordance with your request, we have conducted infiltration testing at the subject site. We are pleased to present this report summarizing the results of the infiltration testing and our design recommendations.

Scope of Services

The scope of services performed for this project was in general accordance with our Proposal No. 21P173, dated February 26, 2021. The scope of services included site reconnaissance, subsurface exploration, field and laboratory testing, and engineering analysis to determine the infiltration rates of the on-site soils. The infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Site and Project Description

The subject site is located at the northwest corner of Placentia Avenue and Murrieta Road in Perris, California. The site is bounded to the north by an active grading site, to the east by Murrieta Road, to the south by Placentia Avenue and to the west by vacant lots. The general location of the site is illustrated on the Site Location Map, included as Plate 1 of this report.

The site consists of a rectangular-shaped parcel, 18.24± acres in size. The site is presently vacant and undeveloped. The ground surface consists of hummocky soil covered by dense native grass and weed growth. Based on historic aerial photographs obtained from Google Earth, the site was previously tilled for agricultural activities between September of 2002 and June of 2012.

Detailed topographic information was not available at the time of this report. Based on elevations obtained from Google Earth and visual observations made at the time of the subsurface investigation, the site is relatively level with localized undulations of 1 to 2± feet.

Proposed Development

A conceptual site plan prepared by RGA, was provided to our office. Based on this plan, the site will be developed with one (1) new warehouse, 379,440± ft² in size, located in the central area of the site. Dock-high doors will be constructed in a cross-dock configuration along the west and east building walls. The building is expected to be surrounded by asphaltic concrete pavements in the parking and drive areas, Portland cement concrete pavements in the truck court areas, and limited areas of concrete flatwork and landscape planters throughout.

We understand that the proposed development will include on-site storm water infiltration. However, the type and location of the infiltration system is not known at the time of this report. Based on previous experience, it is expected that the infiltration system will consist of below grade chambers or a shallow basin.

Concurrent Study

SCG recently conducted a geotechnical investigation at the subject site, which is referenced above. As part of this study, seven (7) borings were advanced to depths of 10 to 50± feet below existing site grades. Native alluvium was encountered at the ground surface at all the boring locations, extending to at least the maximum depth explored of 50± feet. The alluvial soils generally consist of interbedded layers of medium dense to very dense silty sands, sandy silts, and clayey sands with varying clay and fine gravel content and very stiff to hard silty clays, clayey silts and sandy clays with varying sand and silt content.

Groundwater

Free water was encountered during the drilling at two (2) of the boring locations. Water was encountered at 29± feet below existing site grades at Boring No. B-1 and at 27± feet below existing site grades at Boring No. B-5. The remaining boreholes were dry at the time of completion of drilling. Therefore, the static groundwater table is considered to have been present at a depth of 27 to 29± feet below the existing site grades at the time of subsurface exploration.

Recent water level data was obtained from the California Department of Water Resources website, https://wdl.water.ca.gov/waterdatalibrary/. The nearest monitoring well is located approximately 3,168± feet northeast from the site. Water level readings within this monitoring well indicate a high groundwater level of 25± feet below the ground surface in November 2020.

Subsurface Exploration

Scope of Exploration

The subsurface exploration for the infiltration testing consisted of four (4) backhoe-excavated trenches, extending to a depth of 10± feet below existing site grades. The trenches were

logged during excavation by a member of our staff. The approximate locations of the infiltration trenches (identified as I-1 through I-4) are indicated on the Infiltration Test Location Plan, enclosed as Plate 2 of this report.

Geotechnical Conditions

Native alluvium was encountered beneath at the ground surface at all of the infiltration testing locations, extending to at least the maximum explored depth of 10± feet below existing site grades. The alluvial soils consist of medium dense to very dense silty sands and sandy silts with varying clay content. The Trench Logs, which illustrate the conditions encountered at the infiltration test locations, are presented in this report.

Infiltration Testing

We understand that the results of the testing will be used to prepare a preliminary design for the storm water infiltration system that will be used at the subject site. As previously mentioned, the infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Two stainless steel infiltration rings were used for the infiltration testing. The outer infiltration ring is 2 feet in diameter and 20 inches in height. The inner infiltration ring is 1 foot in diameter and 20 inches in height. At the test locations, the outer ring was driven 3± inches into the soil at the base of each trench. The inner ring was centered inside the outer ring and subsequently driven 3± inches into the soil at the base of the trench. The rings were driven into the soil using a ten-pound sledge hammer. The soil surrounding the wall of the infiltration rings was only slightly disturbed during the driving process.

Infiltration Testing Procedure

Infiltration testing was performed at all of the trench locations. The infiltration testing consisted of filling the inner ring and the annular space (the space between the inner and outer rings) with water, approximately 3 to 4 inches above the soil. To prevent the flow of water from one ring to the other, the water level in both the inner ring and the annular space between the rings was maintained using constant-head float valves. The volume of water that was added to maintain a constant head in the inner ring and the annular space during each time interval was determined and recorded. A cap was placed over the rings to minimize the evaporation of water during the tests.

The schedule for readings was determined based on the observed soil type at the base of each backhoe-excavated trench. Based on the existing soils at the trench locations, the volumetric measurements were made at 10-minute increments at I-2, at 20-minute increments at I-1 and I-3, and at 30-minute increments at I-4. The water volume measurements are presented on the spreadsheets enclosed with this report. The infiltration rates for each of the timed intervals are also tabulated on these spreadsheets.

The infiltration rates for the infiltration tests are calculated in centimeters per hour and then converted to inches per hour. The rates are summarized below:

Infiltration Test No.	Depth (feet)	Soil Description	Infiltration Rate (inches/hour)
I-1	10	Silty fine to medium Sand	1.1
I-2	10	Silty fine to medium Sand, trace coarse Sand	5.2
I-3	10	Silty fine to medium Sand, trace coarse Sand, little Clay	0.7
I-4	10	fine to medium Sandy Silt, trace Clay	0.5

Laboratory Testing

Moisture Content

The moisture contents for selected soil samples within the trenches were determined in accordance with ASTM D-2216 and are expressed as a percentage of the dry weight. These test results are presented on the Trench Logs in Plates B-1 through B-4 of this report.

Grain Size Analysis

The grain size distribution of selected soils collected from the base of each infiltration test trench has been determined using a range of wire mesh screens. These tests were performed in general accordance with ASTM D-422 and/or ASTM D-1140. The weight of the portion of the sample retained on each screen is recorded and the percentage finer or coarser of the total weight is calculated. The results of the grainsize analysis are presented on Plates C-1 through C-4 of this report.

Design Recommendations

Four (4) infiltration tests were performed at the subject site. As noted above, the infiltration rates at these locations vary from 0.5 to 5.2 inches per hour. Based on the results of Infiltration Test Nos. I-1 through I-4, we recommend infiltration rates as follows:

Infiltration Test	Location	Infiltration Rate (Inches per Hour)
I-1 and I-2	West of Proposed Building	1.1
I-3 and I-4	East of Proposed Building	0.5

We recommend that a representative from the geotechnical engineer be on-site during the construction of the proposed infiltration system to identify the soil classification at the base of the infiltration basin. It should be confirmed that the soils at the base of the proposed infiltration system corresponds with those presented in this report to ensure that the performance of the system will be consistent with the rates reported herein.

The design of the proposed storm water infiltration system should be performed by the project civil engineer, in accordance with the City of Perris and/or County of Riverside guidelines. However, it is recommended that the systems be constructed so as to facilitate removal of silt and clay, or other deleterious materials from any water that may enter the system. The presence of such materials would decrease the effective infiltration rates. **It is recommended that the project civil engineer apply an appropriate factor of safety. The infiltration rate recommended above is based on the assumption that only clean water will be introduced to the subsurface profile. Any fines, debris, or organic materials could significantly impact the infiltration rate.** It should be noted that the recommended infiltration rate is based on infiltration testing at four (4) discrete locations, and the overall infiltration rate of the storm water infiltration system could vary considerably.

Infiltration Rate Considerations

The infiltration rate presented herein was determined in accordance with the Riverside County guidelines and is considered valid only for the time and place of the actual test. Varying subsurface conditions will exist in other areas of the site, which could alter the recommended infiltration rates presented above. The infiltration rates will decline over time between maintenance cycles as silt or clay particles accumulate on the BMP surface. The infiltration rate is highly dependent upon a number of factors, including density, silt and clay content, grainsize distribution throughout the range of particle sizes, and particle shape. Small changes in these factors can cause large changes in the infiltration rates.

Infiltration rates are based on unsaturated flow. As water is introduced into soils by infiltration, the soils become saturated and the wetting front advances from the unsaturated zone to the saturated zone. Once the soils become saturated, infiltration rates become zero, and water can only move through soils by hydraulic conductivity at a rate determined by pressure head and soil permeability. Changes in soil moisture content will affect the infiltration rate. Infiltration rates should be expected to decrease until the soils become saturated. Soil permeability values will then govern groundwater movement. Permeability values may be on the order of 10 to 20 times less than infiltration rates. The system designer should incorporate adequate factors of safety and allow for overflow design into appropriate traditional storm drain systems, which would transport storm water off-site.

Construction Considerations

The infiltration rates presented in this report are specific to the tested locations and tested depths. Infiltration rates can be significantly reduced if the soils are exposed to excessive disturbance or compaction during construction. Compaction of the soils at the bottom of the infiltration system can significantly reduce the infiltration ability of the basins. Therefore, the subgrade soils within proposed infiltration system areas should not be over-excavated, undercut or compacted in any significant manner. **It is recommended that a note to this effect be added to the project plans and/or specifications.**

We recommend that a representative from the geotechnical engineer be on-site during the construction of the proposed infiltration systems to identify the soil classification at the base of each system. It should be confirmed that the soils at the base of the proposed infiltration

systems correspond with those presented in this report to ensure that the performance of the systems will be consistent with the rates reported herein.

We recommend that scrapers and other rubber-tired heavy equipment not be operated on the basin bottom, or at levels lower than 2 feet above the bottom of the system, particularly within basins. As such, the bottom 24 inches of the infiltration systems should be excavated with non-rubber-tired equipment, such as excavators.

Basin Maintenance

The proposed project may include infiltration basins. Water flowing into these basins will carry some level of sediment. Wind-blown sediments and erosion of the basin side walls will also contribute to sediment deposition at the bottom of the basin. This layer has the potential to significantly reduce the infiltration rate of the basin subgrade soils. Therefore, a formal basin maintenance program should be established to ensure that these silt and clay deposits are removed from the basin on a regular basis. Appropriate vegetation on the basin sidewalls and bottom may reduce erosion and sediment deposition.

Basin maintenance should also include measures to prevent animal burrows, and to repair any burrows or damage caused by such. Animal burrows in the basin sidewalls can significantly increase the risk of erosion and piping failures.

Location of Infiltration Systems

The use of on-site storm water infiltration systems carries a risk of creating adverse geotechnical conditions. Increasing the moisture content of the soil can cause the soil to lose internal shear strength and increase its compressibility, resulting in a change in the designed engineering properties. Overlying structures and pavements in the infiltration area could potentially be damaged due to saturation of the subgrade soils. **The proposed infiltration systems for this site should be located at least 25 feet away from any structures, including retaining walls.** Even with this provision of locating the infiltration system at least 25 feet from the building(s), it is possible that infiltrating water into the subsurface soils could have an adverse effect on the proposed or existing structures. It should also be noted that utility trenches which happen to collect storm water can also serve as conduits to transmit storm water toward the structure, depending on the slope of the utility trench. Therefore, consideration should also be given to the proposed locations of underground utilities which may pass near the proposed infiltration system.

The infiltration system designer should also give special consideration to the effect that the proposed infiltration systems may have on nearby subterranean structures, open excavations, or descending slopes. In particular, infiltration systems should not be located near the crest of descending slopes, particularly where the slopes are comprised of granular soils. Such systems will require specialized design and analysis to evaluate the potential for slope instability, piping failures and other phenomena that typically apply to earthen dam design. This type of analysis is beyond the scope of this infiltration test report, but these factors should be considered by the infiltration system designer when locating the infiltration systems.

General Comments

This report has been prepared as an instrument of service for use by the client in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, structural engineer, and/or civil engineer. The design of the infiltration system is the responsibility of the civil engineer. The role of the geotechnical engineer is limited to determination of infiltration rate only. By using the design infiltration rates contained herein, the civil engineer agrees to indemnify, defend, and hold harmless the geotechnical engineer for all aspects of the design and performance of the infiltration system. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur. The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between trench locations and testing depths. If the conditions encountered during construction vary significantly from those detailed herein, we should be contacted immediately to determine if the conditions alter the recommendations contained herein.

This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to verify that they do not affect the conclusions and recommendations contained herein. We also recommend that the project plans and specifications be submitted to our office for review to verify that our recommendations have been correctly interpreted. The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

Closure

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.



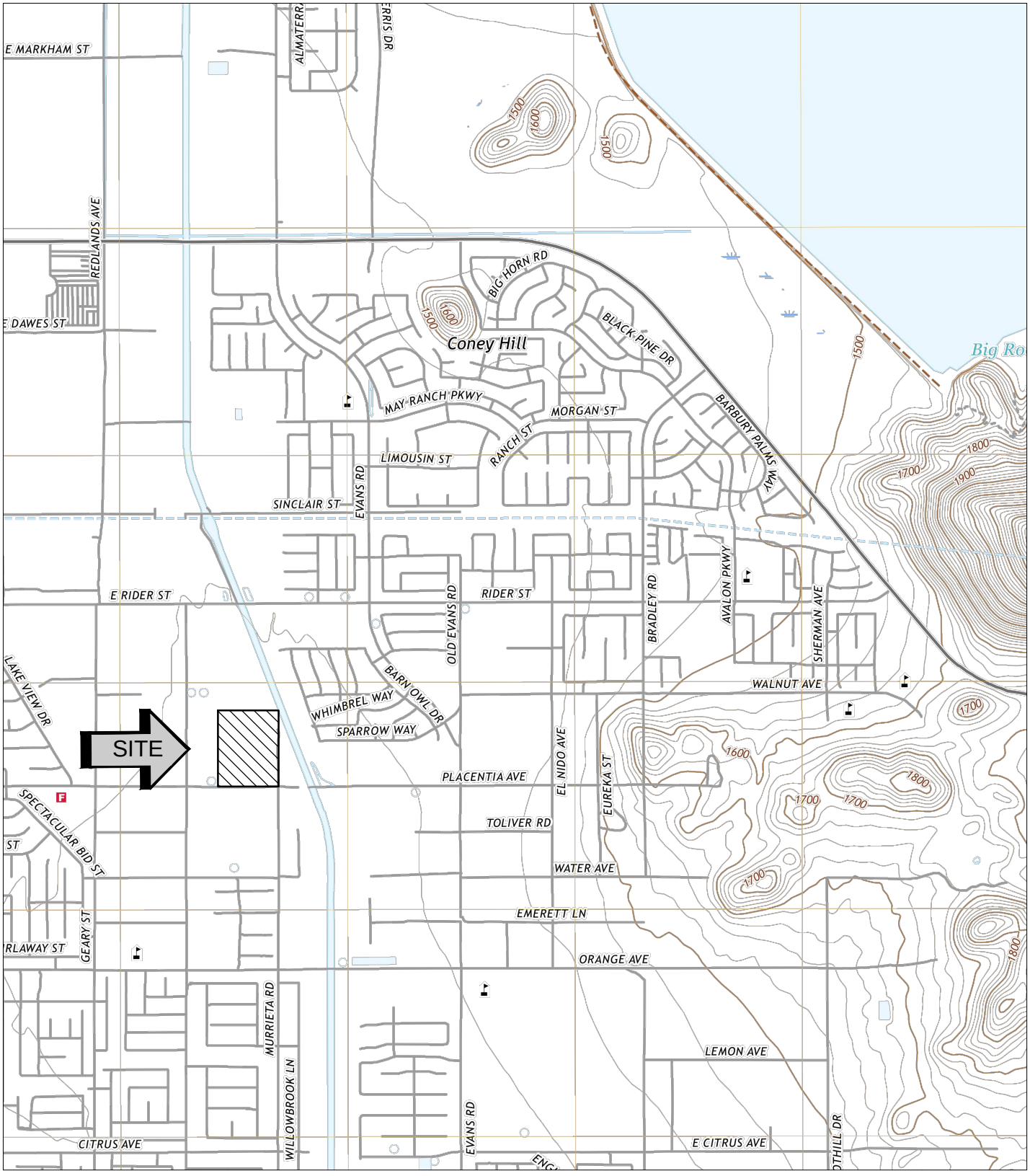
Ricardo Frias, RCE 91772
Project Engineer



Robert G. Trazo, GE 2655
Principal Engineer

Distribution: (1) Addressee

Enclosures: Plate 1 - Site Location Map
Plate 2 - Infiltration Test Location Plan
Trench Log Legend and Logs (6 pages)
Infiltration Test Results Spreadsheets (4 pages)
Grain Size Distribution Graphs (4 pages)



SOURCE: USGS TOPOGRAPHIC MAP OF THE PERRIS QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA, 2018.

SITE LOCATION MAP

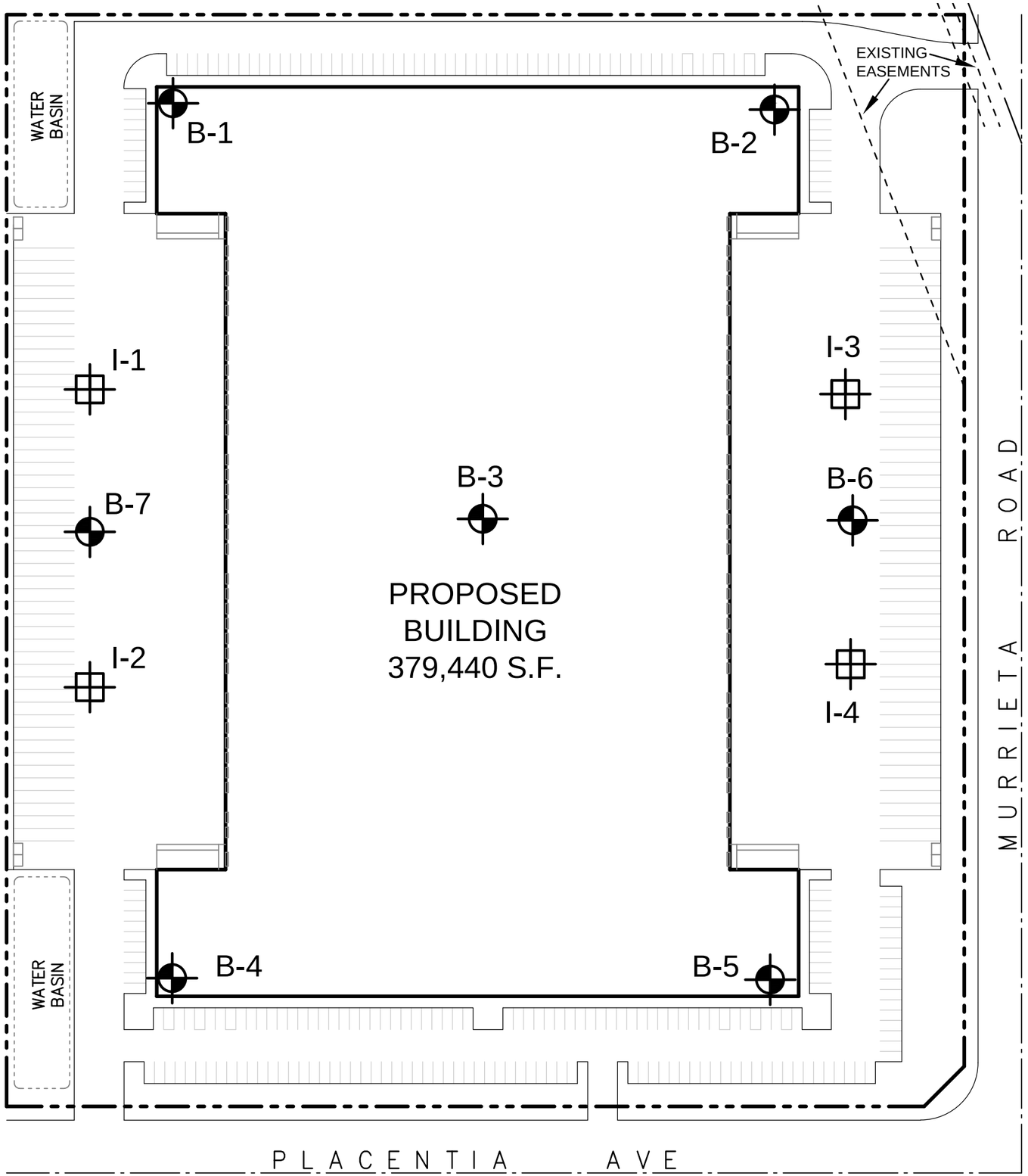
PROPOSED WAREHOUSE

PERRIS, CA

SCALE: 1" = 2000'	
DRAWN: MD CHKD: RF	
SCG PROJECT 21G147-2	
PLATE 1	

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



GEOTECHNICAL LEGEND

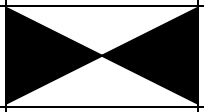
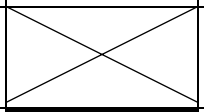
APPROXIMATE INFILTRATION TEST LOCATION

APPROXIMATE BORING LOCATION FROM CONCURRENT STUDY (SCG PROJECT NO. 21G147-1)

NOTE: BASE MAP PREPARED BY RGA.

BORING LOCATION PLAN	
PROPOSED WAREHOUSE	
PERRIS, CALIFORNIA	
SCALE: 1" = 80'	SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JAH CHKD: RF	
SCG PROJECT 21G147-2	
PLATE 2	

TRENCH LOG LEGEND

SAMPLE TYPE	GRAPHICAL SYMBOL	SAMPLE DESCRIPTION
AUGER		SAMPLE COLLECTED FROM AUGER CUTTINGS, NO FIELD MEASUREMENT OF SOIL STRENGTH. (DISTURBED)
CORE		ROCK CORE SAMPLE: TYPICALLY TAKEN WITH A DIAMOND-TIPPED CORE BARREL. TYPICALLY USED ONLY IN HIGHLY CONSOLIDATED BEDROCK.
GRAB		SOIL SAMPLE TAKEN WITH NO SPECIALIZED EQUIPMENT, SUCH AS FROM A STOCKPILE OR THE GROUND SURFACE. (DISTURBED)
CS		CALIFORNIA SAMPLER: 2-1/2 INCH I.D. SPLIT BARREL SAMPLER, LINED WITH 1-INCH HIGH BRASS RINGS. DRIVEN WITH SPT HAMMER. (RELATIVELY UNDISTURBED)
NSR		NO RECOVERY: THE SAMPLING ATTEMPT DID NOT RESULT IN RECOVERY OF ANY SIGNIFICANT SOIL OR ROCK MATERIAL.
SPT		STANDARD PENETRATION TEST: SAMPLER IS A 1.4 INCH INSIDE DIAMETER SPLIT BARREL, DRIVEN 18 INCHES WITH THE SPT HAMMER. (DISTURBED)
SH		SHELBY TUBE: TAKEN WITH A THIN WALL SAMPLE TUBE, PUSHED INTO THE SOIL AND THEN EXTRACTED. (UNDISTURBED)
VANE		VANE SHEAR TEST: SOIL STRENGTH OBTAINED USING A 4 BLADED SHEAR DEVICE. TYPICALLY USED IN SOFT CLAYS-NO SAMPLE RECOVERED.

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

BLOW COUNT: Number of blows required to advance the sampler 12 inches using a 140 lb hammer with a 30-inch drop. 50/3" indicates penetration refusal (>50 blows) at 3 inches. WH indicates that the weight of the hammer was sufficient to push the sampler 6 inches or more.

POCKET PEN.: Approximate shear strength of a cohesive soil sample as measured by pocket penetrometer.

GRAPHIC LOG: Graphic Soil Symbol as depicted on the following page.

DRY DENSITY: Dry density of an undisturbed or relatively undisturbed sample in lbs/ft^3.

MOISTURE CONTENT: Moisture content of a soil sample, expressed as a percentage of the dry weight.

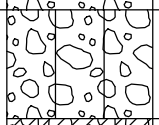
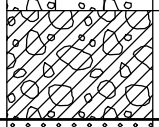
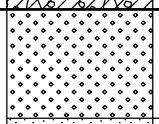
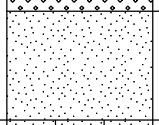
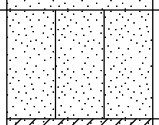
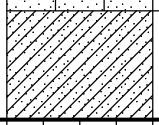
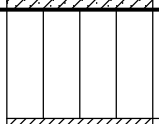
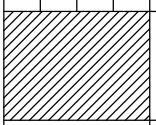
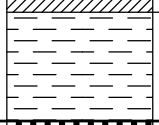
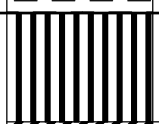
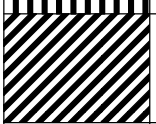
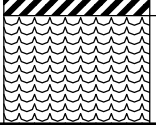
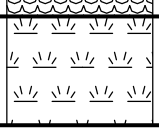
LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

PLASTIC LIMIT: The moisture content above which a soil behaves as a plastic.

PASSING #200 SIEVE: The percentage of the sample finer than the #200 standard sieve.

UNCONFINED SHEAR: The shear strength of a cohesive soil sample, as measured in the unconfined state.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

TRENCH NO. I-1

JOB NO.: 21G147-2
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 3/30/21
EXCAVATION METHOD: Backhoe
LOGGED BY: Caleb Brackett

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					ALLUVIUM: Red Brown Silty fine to medium Sand, medium dense to dense-damp							
5												
							7					
10					Trench Terminated at 10'							

TBL 21G147-2.GPJ SOCALGEO.GDT 4/20/21

TEST TRENCH LOG **PLATE B-1**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

TRENCH NO. I-2

JOB NO.: 21G147-2
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 3/30/21
EXCAVATION METHOD: Backhoe
LOGGED BY: Caleb Brackett

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5					ALLUVIUM: Light Gray Brown Silty fine to medium Sand, trace coarse Sand, trace calcareous nodules, medium dense to dense-very moist		13					
10					Trench Terminated at 10'							

TBL 21G147-2.GPJ SOCALGEO.GDT 4/20/21

TEST TRENCH LOG **PLATE B-2**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

TRENCH NO. I-3

JOB NO.: 21G147-2
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 4/1/21
EXCAVATION METHOD: Backhoe
LOGGED BY: Caleb Brackett

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					ALLUVIUM: Light Gray Brown Silty fine to medium Sand, trace coarse Sand, little Clay, very dense-moist							
5												
							11					
10					Trench Terminated at 10'							

TBL 21G147-2.GPJ SOCALGEO.GDT 4/20/21

TEST TRENCH LOG **PLATE B-3**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

TRENCH NO. I-4

JOB NO.: 21G147-2
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 4/1/21
EXCAVATION METHOD: Backhoe
LOGGED BY: Caleb Brackett

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					ALLUVIUM: Light Brown fine to medium Sandy Silt, trace Clay, very dense-damp							
5												
							6					
10					Trench Terminated at 10'							

TBL 21G147-2.GPJ SOCALGEO.GDT 4/20/21

TEST TRENCH LOG **PLATE B-4**

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse
Project Location	Perris, California
Project Number	21G147-2
Engineer	Caleb Brackett

Infiltration Test No: I-1

Constants

	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Flow Readings: Ring Flow (cm^3)	Flow Readings: Annular Ring (ml)	Flow Readings: Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Infiltration Rates: Annular Space* (cm/hr)	Infiltration Rates: Inner Ring* (in/hr)	Infiltration Rates: Annular Space* (in/hr)
1	Initial	7:00 AM	20	0	1400	0	5700	5.76	7.81	2.27	3.08
	Final	7:20 AM	**20**	1400		5700					
2	Initial	7:20 AM	20	0	900	0	4700	3.70	6.44	1.46	2.54
	Final	7:40 AM	**40**	900		4700					
3	Initial	7:40 AM	20	0	800	0	4300	3.29	5.89	1.30	2.32
	Final	8:00 AM	**60**	800		4300					
4	Initial	8:00 AM	20	0	700	0	4000	2.88	5.48	1.13	2.16
	Final	8:20 AM	**80**	700		4000					
5	Initial	8:20 AM	20	0	700	0	4000	2.88	5.48	1.13	2.16
	Final	8:40 AM	**100**	700		4000					
6	Initial	8:40 AM	20	0	650	0	4000	2.67	5.48	1.05	2.16
	Final	9:00 AM	**120**	650		4000					
7	Initial	9:00 AM	20	0	700	0	4100	2.88	5.62	1.13	2.21
	Final	9:20 AM	**140**	700		4100					
8	Initial	9:20 AM	20	0	650	0	4000	2.67	5.48	1.05	2.16
	Final	9:40 AM	**160**	650		4000					
9	Initial	9:40 AM	20	0	650	0	4000	2.67	5.48	1.05	2.16
	Final	10:00 AM	**180**	650		4000					

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse
Project Location	Perris, California
Project Number	21G147-2
Engineer	Caleb Brackett

Infiltration Test No: I-2

Constants

	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Ring Flow (cm^3)	Annular Ring (ml)	Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	10:20 AM	10	0	2800	0	9100	23.03	24.94	9.07	9.82
	Final	10:30 AM	**10**	2800		9100					
2	Initial	10:30 AM	10	0	2350	0	7800	19.32	21.38	7.61	8.42
	Final	10:40 AM	**20**	2350		7800					
3	Initial	10:40 AM	10	0	2000	0	7000	16.45	19.19	6.48	7.55
	Final	10:50 AM	**30**	2000		7000					
4	Initial	10:50 AM	10	0	1750	0	6200	14.39	16.99	5.67	6.69
	Final	11:00 AM	**40**	1750		6200					
5	Initial	11:00 AM	10	0	1750	0	2800	14.39	7.68	5.67	3.02
	Final	11:10 AM	**50**	1750		2800					
6	Initial	11:10 AM	10	0	1800	0	3000	14.80	8.22	5.83	3.24
	Final	11:20 AM	**60**	1800		3000					
7	Initial	11:20 AM	10	0	1650	0	3100	13.57	8.50	5.34	3.35
	Final	11:30 AM	**70**	1650		3100					
8	Initial	11:30 AM	10	0	1600	0	3000	13.16	8.22	5.18	3.24
	Final	11:40 AM	**80**	1600		3000					
9	Initial	11:40 AM	10	0	1550	0	3000	12.75	8.22	5.02	3.24
	Final	11:50 AM	**90**	1550		3000					
10	Initial	11:50 AM	10	0	1600	0	3000	13.16	8.22	5.18	3.24
	Final	12:00 PM	**100**	1600		3000					

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse
Project Location	Perris, California
Project Number	21G147-2
Engineer	Caleb Brackett

Infiltration Test No: I-3

Constants	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Flow Readings: Ring Flow (cm^3)	Flow Readings: Annular Ring (ml)	Flow Readings: Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Infiltration Rates: Annular Space* (cm/hr)	Infiltration Rates: Inner Ring* (in/hr)	Infiltration Rates: Annular Space* (in/hr)
1	Initial	7:40 AM	20	0	1100	0	6300	4.52	8.63	1.78	3.40
	Final	8:00 AM	**20**	1100		6300					
2	Initial	8:00 AM	20	0	700	0	3100	2.88	4.25	1.13	1.67
	Final	8:20 AM	**40**	700		3100					
3	Initial	8:20 AM	20	0	550	0	2500	2.26	3.43	0.89	1.35
	Final	8:40 AM	**60**	550		2500					
4	Initial	8:40 AM	20	0	500	0	2100	2.06	2.88	0.81	1.13
	Final	9:00 AM	**80**	500		2100					
5	Initial	9:00 AM	20	0	450	0	2100	1.85	2.88	0.73	1.13
	Final	9:20 AM	**100**	450		2100					
6	Initial	9:20 AM	20	0	450	0	2000	1.85	2.74	0.73	1.08
	Final	9:40 AM	**120**	450		2000					

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse
Project Location	Perris, California
Project Number	21G147-2
Engineer	Caleb Brackett

Infiltration Test No: I-4

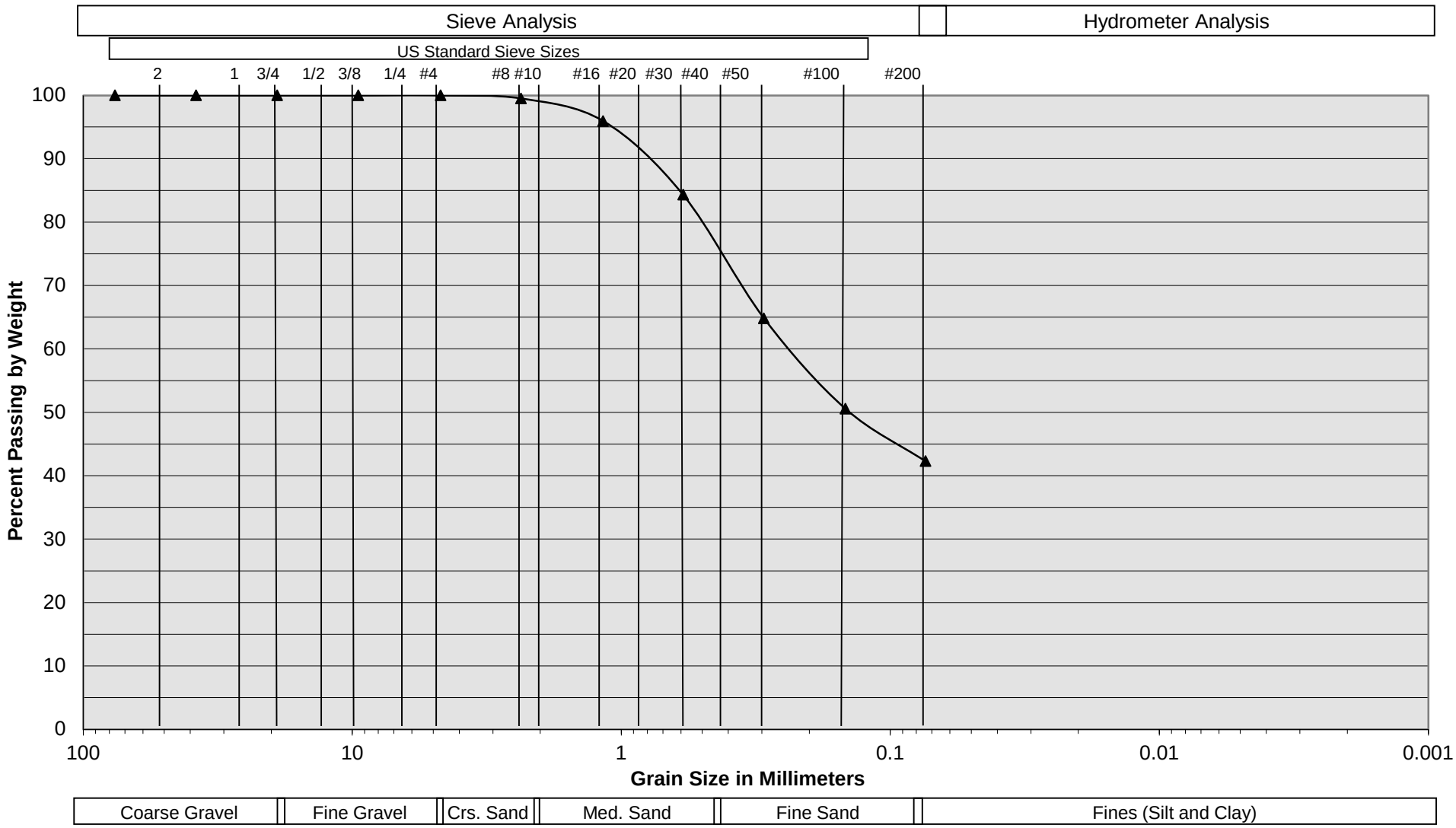
Constants

	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Flow Readings: Ring Flow (cm^3)	Flow Readings: Annular Ring (ml)	Flow Readings: Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Infiltration Rates: Annular Space* (cm/hr)	Infiltration Rates: Inner Ring* (in/hr)	Infiltration Rates: Annular Space* (in/hr)
1	Initial	10:00 AM	30	0	0	0	0	0.00	0.00	0.00	0.00
	Final	10:30 AM	**30**	0		0					
2	Initial	10:30 AM	30	0	500	0	300	1.37	0.27	0.54	0.11
	Final	11:00 AM	**60**	500		300					
3	Initial	11:00 AM	30	0	500	0	300	1.37	0.27	0.54	0.11
	Final	11:30 AM	**90**	500		300					
4	Initial	11:30 AM	30	0	500	0	300	1.37	0.27	0.54	0.11
	Final	12:00 PM	**120**	500		300					

Grain Size Distribution

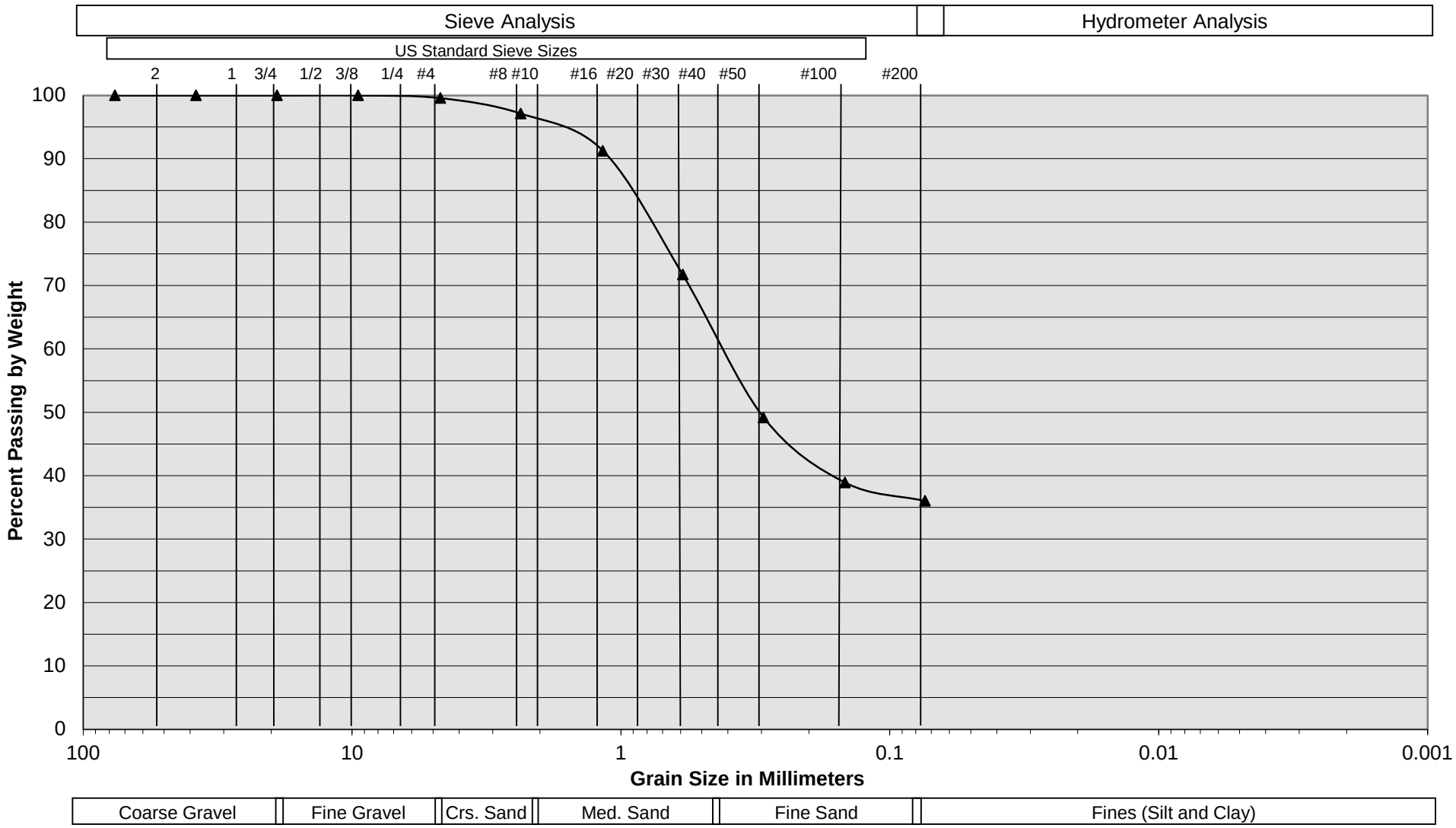


Sample Description	I-1 @ 9'
Soil Classification	Red Brown Silty fine to medium Sand

Proposed Warehouse
Perris, California
Project No. 21G147-2
PLATE C- 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution

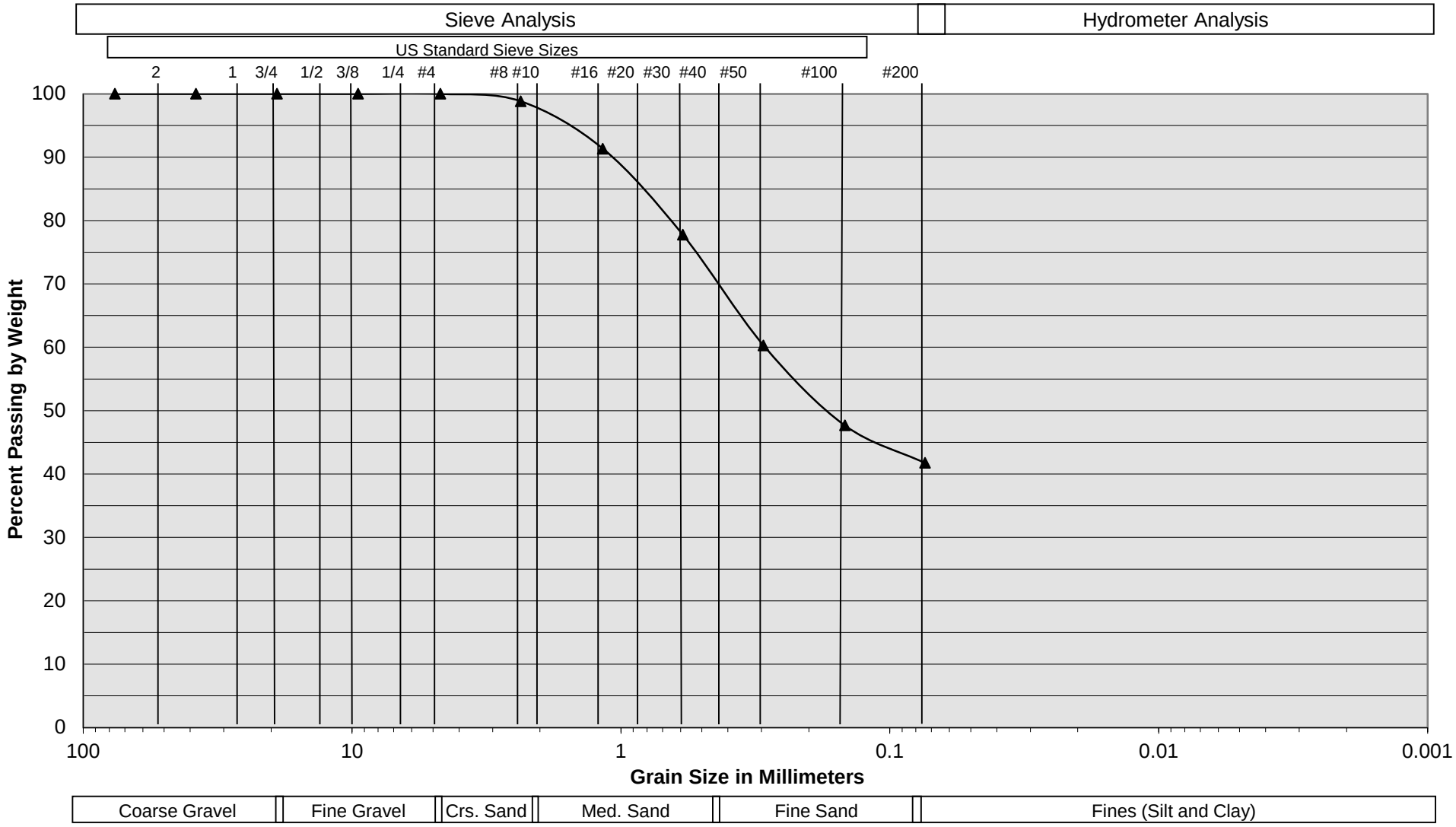


Sample Description	I-2 @ 9'
Soil Classification	Light Gray Brown Silty fine to medium Sand, trace coarse Sand

Proposed Warehouse
Perris, California
Project No. 21G147-2
PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution



Sample Description	I-3 @ 9'
Soil Classification	Light Gray Brown Silty fine to medium Sand, trace coarse Sand, little Clay

Proposed Warehouse
Perris, California
Project No. 21G147-2
PLATE C- 3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution



Sample Description	I-4 @ 9'
Soil Classification	Light Brown fine to medium Sandy Silt, trace Clay

Proposed Warehouse
Perris, California
Project No. 21G147-2
PLATE C- 4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

UPDATED GEOTECHNICAL INVESTIGATION
PROPOSED WAREHOUSE

NWC Placentia Avenue at Murrieta Road
Perris, California
for
Lake Creek industrial, LLC

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

August 20, 2021

Lake Creek Industrial, LLC
1302 Brittany Cross Road
Santa Ana, California 92705

Attention: Mr. Bob Kubichek
Senior Vice President

Project No.: **21G147-3**

Subject: **Updated Geotechnical Investigation**
Proposed Warehouse
NWC Placentia Avenue at Murrieta Road
Perris, California

Gentlemen:

In accordance with your request, we have conducted a geotechnical investigation at the subject site. We are pleased to present this report summarizing the conclusions and recommendations developed from our investigation.

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Pablo Montes Jr.
Staff Engineer

Robert G. Trazo, GE 2655
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
ROBERT TRAZO
No. 2655
GEOTECHNICAL
STATE OF CALIFORNIA

Distribution: (1) Addressee

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1.0 EXECUTIVE SUMMARY

Presented below is a brief summary of the conclusions and recommendations of this investigation. Since this summary is not all inclusive, it should be read in complete context with the entire report.

Geotechnical Design Considerations

- Our site-specific liquefaction evaluation indicates that some of the on-site soils are subject to liquefaction during the design seismic event.
- The results of the liquefaction evaluation indicate total dynamic settlements ranging between 0.0 and 0.8± inches. The liquefaction induced differential settlements are expected to be on the order of ½± inch.
- The results of the corrosivity testing indicate that the near surface soils are severely corrosive to buried metallic improvements such as ductile iron pipe and to copper pipe.
- The near-surface alluvial soils possess varying strengths. These soils, in their present condition, are not considered suitable for support of the foundation loads of the new structure.
- Remedial grading will be necessary to remove a portion of the near-surface alluvial soils and replace them as compacted structural fill. Generally, the existing soils may be reused as structural fill.

Site Preparation Recommendations

- Initial site preparation should include stripping of any surficial vegetation. This includes the removal of native grass and weeds present within the site. These materials should be disposed of off-site. Concrete and miscellaneous debris material should also be disposed of off-site.
- Remedial grading is recommended to be performed within the proposed building area in order to remove a portion of the near-surface native alluvial soils. The soils within the proposed building area should be overexcavated to a depth of 4 feet below existing grade and to a depth of at least 4 feet below proposed building pad subgrade elevations. Deeper overexcavations, extending to depths of 5 to 6± feet, may be necessary in areas where loose soils are encountered at the base of the planned bottom of overexcavation.
- The proposed foundation influence zones should be overexcavated to a depth of at least 4 feet below proposed foundation bearing grade.
- After overexcavation has been completed, the subgrade soils should be evaluated by the geotechnical engineer to identify any additional soils that should be overexcavated. The resulting subgrade should then be scarified to a depth of 12 inches, moisture conditioned or air dried to 2 to 4 percent above optimum, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. The previously excavated soils may then be replaced as compacted structural fill.
- The new pavement and flatwork subgrade soils are recommended to be scarified to a depth of 12± inches, moisture conditioned and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density.

Building Foundation Recommendations

- Spread footing foundations, supported in newly placed structural fill soils.
- Maximum, net allowable soil bearing pressure: 2,500 lbs/ft^2.

- Minimum longitudinal steel reinforcement within strip footings: Six (6) No. 5 rebars (3 top and 3 bottom), due to the presence of potentially expansive soils.

Building Floor Slab Recommendations

- Conventional slab-on-grade, at least 6 inches thick
- Modulus of subgrade reaction: k = 100 psi/in
- Reinforcement is not considered to be necessary for geotechnical considerations.
- Minimum slab reinforcement: No. 3 bars at 18-inches on-center, in both directions, due to the presence of medium expansive soils at this site. The actual floor slab reinforcement should be determined by the structural engineer, based upon the imposed loading.

Pavements

ASPHALT PAVEMENTS (R=20)					
Materials	**Thickness (inches)**				
	Auto Parking and Auto Drive Lanes (TI = 4.0 to 5.0)	Truck Traffic			
		TI = 6.0	TI = 7.0	TI = 8.0	TI = 9.0
Asphalt Concrete	3	3½	4	5	5½
Aggregate Base	8	10	12	14	16
Compacted Subgrade	12	12	12	12	12

PORTLAND CEMENT CONCRETE PAVEMENTS (R=20)				
Materials	**Thickness (inches)**			
	Autos and Light Truck Traffic (TI = 6.0)	Truck Traffic		
		TI = 7.0	TI = 8.0	TI = 9.0
PCC	5	5½	7	8½
Compacted Subgrade (95% minimum compaction)	12	12	12	12

2.0 SCOPE OF SERVICES

The scope of services performed for this project was in accordance with our Change Order No. 21GP147-CO, dated July 20, 2021. The scope of services included the review of the previously prepared geotechnical report to provide criteria for preparing the design of the building foundations, building floor slab, and parking lot pavements along with site preparation recommendations and construction considerations for the proposed development. Based on the location of this site, this investigation also included a site-specific liquefaction evaluation. The evaluation of the environmental aspects of this site was beyond the scope of services for this geotechnical investigation.

3.0 SITE AND PROJECT DESCRIPTION

3.1 Site Conditions

The subject site is located at the northwest corner of Placentia Avenue and Murrieta Road in Perris, California. The site is bounded to the north by an active grading site, to the east by Murrieta Road, to the south by Placentia Avenue and to the west by vacant lots. The general location of the site is illustrated on the Site Location Map, included as Plate 1 of this report.

The site consists of a nearly rectangular-shaped parcel, 26.13± acres in size. The site is presently vacant and undeveloped. The ground surface consists of moderate to dense native grass and weed growth throughout. During the site investigation a 4- to 8-foot-high berm was found located in the southern region of the property. The berm consisted of Portland cement concrete debris and stockpiled soils surrounded by native grass and weed growth. Based on historic aerial photographs obtained from Google Earth, the site was previously tilled for agricultural activities between September of 2002 and June of 2012.

Detailed topographic information was not available at the time of this report. Based on elevations obtained from Google Earth and visual observations made at the time of the subsurface investigation, the site is relatively level with localized undulations of 1 to 2± feet.

3.2 Proposed Development

A conceptual site plan prepared by RGA, was provided to our office. Based on this plan, the site will be developed with one (1) new warehouse, 514,520± ft² in size, located in the central area of the site. Dock-high doors will be constructed in a cross-dock configuration along the north and south building walls. The building is expected to be surrounded by asphaltic concrete pavements in the parking and drive areas, Portland cement concrete pavements in the truck court areas, and limited areas of concrete flatwork and landscape planters throughout.

Detailed structural information has not been provided. It is assumed that the new building will be a single-story structure of tilt-up concrete construction, supported on a conventional shallow foundation system with a concrete slab-on-grade floor. Based on the assumed construction, maximum column and wall loads are expected to be on the order of 100 kips and 4 to 7 kips per linear foot, respectively.

No significant amounts of below grade construction, such as basements or crawl spaces, are expected to be included in the proposed development. Based on the assumed topography, cuts and fills of up to 1 to 2± feet are expected to be necessary to achieve the proposed site grades.

3.3 Previous Studies

SCG recently performed a geotechnical investigation for the project site. The results of this investigation are presented in the above referenced report. As part of this investigation, a total of seven (7) borings were advanced to depths of 10 to 50± feet. Native alluvium was encountered at the ground surface at all the boring locations, extending to at least the maximum depth explored of 50± feet. The alluvial soils generally consist of interbedded layers of medium dense to very dense silty sands, sandy silts, and clayey sands with varying clay and fine gravel content and very stiff to hard silty clays, clayey silts and sandy clays with varying sand and silt content.

Results of laboratory testing indicate the on-site soils to possess a medium expansion potential (EI = 56) and the soils to be corrosive to buried metal pipes. A liquefaction evaluation was performed using data obtained from the two 50-foot-deep borings. The result of the analysis indicated total liquefaction induced settlements of 0 to 0.54± inches.

4.0 SUBSURFACE EXPLORATION

4.1 Scope of Exploration/Sampling Methods

The subsurface exploration conducted for this project consisted of ten (10) borings advanced to depths of 10 to 50± feet below the existing site grades. Boring Nos. B-1 through B-7 were performed as part of the previous study. All of the borings were logged during drilling by a member of our staff.

The borings were advanced with hollow-stem augers, by a conventional truck-mounted drilling rig. Representative bulk and relatively undisturbed soil samples were taken during drilling. Relatively undisturbed soil samples were taken with a split barrel "California Sampler" containing a series of one inch long, 2.416± inch diameter brass rings. This sampling method is described in ASTM Test Method D-3550. In-situ samples were also taken using a 1.4± inch inside diameter split spoon sampler, in general accordance with ASTM D-1586. Both of these samplers are driven into the ground with successive blows of a 140-pound weight falling 30 inches. The blow counts obtained during driving are recorded for further analysis. Bulk samples were collected in plastic bags to retain their original moisture content. The relatively undisturbed ring samples were placed in molded plastic sleeves that were then sealed and transported to our laboratory.

The approximate locations of the borings are indicated on the Boring Location Plan, included as Plate 2 in Appendix A of this report. The Boring Logs, which illustrate the conditions encountered at the boring locations, as well as the results of some of the laboratory testing, are included in Appendix B.

4.2 Geotechnical Conditions

Alluvium

Native alluvium was encountered at the ground surface at all the boring locations, extending to at least the maximum depth explored of 50± feet. The alluvial soils generally consist of interbedded layers of medium dense to very dense silty sands, sandy silts, and clayey sands with varying clay and fine gravel content and very stiff to hard silty clays, clayey silts and sandy clays with varying sand and silt content.

Groundwater

Free water was encountered during the drilling at three (3) of the boring locations. Water was encountered at depths of 27 to 30± feet below existing site grades at Boring Nos. B-1, B-5 and B-9. The remaining boreholes were dry at the time of completion of drilling. Therefore, the static groundwater table is considered to have been present at depths of 27 to 30± feet below the existing site grades at the time of subsurface exploration.

Recent water level data was obtained from the California Department of Water Resources website, https://wdl.water.ca.gov/waterdatalibrary/. The nearest monitoring well is located approximately 3,168± feet northeast from the site. Water level readings within this monitoring well indicate a high groundwater level of 25± feet below the ground surface in November 2020.

5.0 LABORATORY TESTING

The soil samples recovered from the subsurface exploration were returned to our laboratory for further testing to determine selected physical and engineering properties of the soils. The tests are briefly discussed below. It should be noted that the test results are specific to the actual samples tested, and variations could be expected at other locations and depths.

Classification

All recovered soil samples were classified using the Unified Soil Classification System (USCS), in accordance with ASTM D-2488. Field identifications were then supplemented with additional visual classifications and/or by laboratory testing. The USCS classifications are shown on the Boring Logs and are periodically referenced throughout this report.

Density and Moisture Content

The density has been determined for selected relatively undisturbed ring samples. These densities were determined in general accordance with the method presented in ASTM D-2937. The results are recorded as dry unit weight in pounds per cubic foot. The moisture contents are determined in accordance with ASTM D-2216, and are expressed as a percentage of the dry weight. These test results are presented on the Boring Logs.

Grain Size Analysis

Limited grain size analyses have been performed on several selected samples, in accordance with ASTM D-1140. These samples were washed over a #200 sieve to determine the percentage of fine-grained material in each sample, which is defined as the material which passes the #200 sieve. The weight of the portion of the sample retained on each screen is recorded and the percentage finer or coarser of the total weight is calculated. The results of these laboratory tests are shown on the attached boring logs.

Consolidation

Selected soil samples have been tested to determine their consolidation potential, in accordance with ASTM D-2435. The testing apparatus is designed to accept either natural or remolded samples in a one-inch high ring, approximately 2.416 inches in diameter. Each sample is then loaded incrementally in a geometric progression and the resulting deflection is recorded at selected time intervals. Porous stones are in contact with the top and bottom of the sample to permit the addition or release of pore water. The samples are typically inundated with water at an intermediate load to determine their potential for collapse or heave. The results of the consolidation testing are plotted on Plates C-1 through C-4 in Appendix C of this report. The results of the consolidation testing performed during the referenced geotechnical investigation are plotted on Appendix G of this report.

Maximum Dry Density and Optimum Moisture Content

One representative bulk sample has been tested for its maximum dry density and optimum

moisture content. The results have been obtained using the Modified Proctor procedure, per ASTM D-1557 and are presented on Plate C-5 in Appendix G of this report. This test is generally used to compare the in-situ densities of undisturbed field samples, and for later compaction testing. Additional testing of other soil types or soil mixes may be necessary at a later date.

Expansion Index

The expansion potential of the on-site soils was determined in general accordance with ASTM D-4829. The testing apparatus is designed to accept a 4-inch diameter, 1-in high, remolded sample. The sample is initially remolded to 50± 1 percent saturation and then loaded with a surcharge equivalent to 144 pounds per square foot. The sample is then inundated with water and allowed to swell against the surcharge. The resultant swell or consolidation is recorded after a 24-hour period. The results of the EI testing are as follows:

Sample Identification	Expansion Index	Expansive Potential
B-2 @ 0 to 5 feet (From Previous Study)	56	Medium

Soluble Sulfates

Representative samples of the near-surface soil were submitted to a subcontracted analytical laboratory for determination of soluble sulfate content. Soluble sulfates are naturally present in soils, and if the concentration is high enough, can result in degradation of concrete which comes into contact with these soils. The results of the soluble sulfate testing are presented below, and are discussed further in a subsequent section of this report.

Sample Identification	Soluble Sulfates (%)	Sulfate Classification
B-3 @ 0 to 5 feet (From Previous Study)	0.014	Not Applicable (S0)
B-9 @ 0 to 5 feet	0.023	Not Applicable (S0)

Corrosivity Testing

Representative samples of the near-surface soils were submitted to a subcontracted corrosion engineering laboratory to identify potentially corrosive characteristics with respect to common construction materials. The corrosivity testing included a determination of the electrical resistivity, pH, and chloride and nitrate concentrations of the soils, as well as other tests. The results of some of these tests are presented below.

Sample Identification	Saturated Resistivity (ohm-cm)	pH	Chlorides (mg/kg)	Nitrates (mg/kg)
B-3 @ 0 to 5 feet (From Previous Study)	840	7.8	22	656
B-9 @ 0 to 5 feet	960	7.8	77	384

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our review, field exploration, laboratory testing and geotechnical analysis, the proposed development is considered feasible from a geotechnical standpoint. The recommendations contained in this report should be taken into the design, construction, and grading considerations.

The recommendations in this report are contingent upon all grading and foundation construction activities being monitored by the geotechnical engineer of record. The recommendations are provided with the assumption that an adequate program of client consultation, construction monitoring, and testing will be performed during the final design and construction phases to verify compliance with these recommendations. Maintaining Southern California Geotechnical, Inc., (SCG) as the geotechnical consultant from the beginning to the end of the project will provide continuity of services. The geotechnical engineering firm providing testing and observation services shall assume the responsibility of Geotechnical Engineer of Record.

The Grading Guide Specifications, included as Appendix D, should be considered part of this report, and should be incorporated into the project specifications. The contractor and/or owner of the development should bring to the attention of the geotechnical engineer any conditions that differ from those stated in this report, or which may be detrimental for the development.

6.1 Seismic Design Considerations

The subject site is located in an area which is subject to strong ground motions due to earthquakes. The performance of a site specific seismic hazards analysis was beyond the scope of this investigation. However, numerous faults capable of producing significant ground motions are located near the subject site. Due to economic considerations, it is not generally considered reasonable to design a structure that is not susceptible to earthquake damage. Therefore, significant damage to structures may be unavoidable during large earthquakes. The proposed structures should, however, be designed to resist structural collapse and thereby provide reasonable protection from serious injury, catastrophic property damage and loss of life.

Faulting and Seismicity

Research of available maps indicates that the subject site is not located within an Alquist-Priolo Earthquake Fault Zone. Furthermore, SCG did not identify any evidence of faulting during the geotechnical investigation. Therefore, the possibility of significant fault rupture on the site is considered to be low.

The potential for other geologic hazards such as seismically induced settlement, lateral spreading, tsunamis, inundation, seiches, flooding, and subsidence affecting the site is considered low.

Seismic Design Parameters

The 2019 California Building Code (CBC) provides procedures for earthquake resistant structural design that include considerations for on-site soil conditions, occupancy, and the configuration of

the structure including the structural system and height. The seismic design parameters presented below are based on the soil profile and the proximity of known faults with respect to the subject site.

Based on standards in place at the time of this report, the proposed development is expected to be designed in accordance with the requirements of the 2019 edition of the California Building Code (CBC), which was adopted on January 1, 2020.

The 2019 CBC Seismic Design Parameters have been generated using the SEAOC/OSHPD Seismic Design Maps Tool, a web-based software application available at the website www.seismicmaps.org. This software application calculates seismic design parameters in accordance with several building code reference documents, including ASCE 7-16, upon which the 2019 CBC is based. The application utilizes a database of risk-targeted maximum considered earthquake (MCE_R) site accelerations at 0.01-degree intervals for each of the code documents. The tables below were created using data obtained from the application. The output generated from this program is included as Plate E-1 in Appendix E of this report.

The 2019 CBC requires that a site-specific ground motion study be performed in accordance with Section 11.4.8 of ASCE 7-16 for Site Class D sites with a mapped S_1 value greater than 0.2. However, Section 11.4.8 of ASCE 7-16 also indicates an exception to the requirement for a site-specific ground motion hazard analysis for certain structures on Site Class D sites. The commentary for Section 11 of ASCE 7-16 (Page 534 of Section C11 of ASCE 7-16) indicates that "In general, this exception effectively limits the requirements for site-specific hazard analysis to very tall and or flexible structures at Site Class D sites." **Based on our understanding of the proposed development, the seismic design parameters presented below were calculated assuming that the exception in Section 11.4.8 applies to the proposed structure at this site. However, the structural engineer should verify that this exception is applicable to the proposed structure.** Based on the exception, the spectral response accelerations presented below were calculated using the site coefficients (F_a and F_v) from Tables 1613.2.3(1) and 1613.2.3(2) presented in Section 16.4.4 of the 2019 CBC.

2019 CBC SEISMIC DESIGN PARAMETERS

Parameter		Value
Mapped Spectral Acceleration at 0.2 sec Period	S_S	1.500
Mapped Spectral Acceleration at 1.0 sec Period	S_1	0.572
Site Class	---	D*
Site Modified Spectral Acceleration at 0.2 sec Period	S_{MS}	1.500
Site Modified Spectral Acceleration at 1.0 sec Period	S_{M1}	0.988
Design Spectral Acceleration at 0.2 sec Period	S_{DS}	1.000
Design Spectral Acceleration at 1.0 sec Period	S_{D1}	0.659

*The 2019 CBC requires that Site Class F be assigned to any profile containing soils vulnerable to potential failure or collapse under seismic loading, such as liquefiable soils. For Site Class F, the site *coefficients* are to be determined in accordance with Section 11.4.7 of ASCE 7-16. However, Section 20.3.1 of ASCE 7-16 indicates that for sites with structures having a fundamental period of vibration equal to or less than 0.5 seconds, the site coefficient factors (F_a and F_v) may be determined using the standard procedures. The seismic design parameters tabulated above were calculated using the site coefficient factors for Site Class D, assuming that the fundamental period of the structure(s) is less than 0.5 seconds. However, the results of the liquefaction evaluation indicate that the

subject site is underlain by potentially liquefiable soils. Therefore, if the proposed structure has a fundamental period greater than 0.5 seconds, a site-specific seismic hazards analysis will be required and additional subsurface exploration will be necessary.

It should be noted that the site coefficient F_v and the parameters S_{M1} and S_{D1} were not included in the SEAOC/OSHPD Seismic Design Maps Tool output for the 2019 CBC. We calculated these parameters-based on Table 1613.2.3(2) in Section 16.4.4 of the 2019 CBC using the value of S_1 obtained from the Seismic Design Maps Tool, assuming that a site-specific ground motion hazards analysis is not required for the proposed buildings at this site.

Ground Motion Parameters

For the purposes of the liquefaction analysis performed for this study, we utilized a site acceleration consistent with maximum considered earthquake ground motions, as required by the 2019 CBC. The peak ground acceleration (PGA) was determined in accordance with Section 11.8.3 of ASCE 7-16. The parameter PGA_M is the maximum considered earthquake geometric mean (MCE_G) PGA, multiplied by the appropriate site coefficient from Table 11.8-1 of ASCE 7-16. The web-based software application SEAOC/OSHPD Seismic Design Maps Tool (described in the previous section) was used to determine PGA_M, which is 0.550g. A portion of the program output is included as Plate E-1 of this report. An associated earthquake magnitude was obtained from the USGS Unified Hazard Tool, Interactive Deaggregation application available on the USGS website. The deaggregated modal magnitude is 6.97, based on the peak ground acceleration and soil classification D.

Liquefaction

Liquefaction is the loss of strength in generally cohesionless, saturated soils when the pore-water pressure induced in the soil by a seismic event becomes equal to or exceeds the overburden pressure. The primary factors which influence the potential for liquefaction include groundwater table elevation, soil type and plasticity characteristics, relative density of the soil, initial confining pressure, and intensity and duration of ground shaking. The depth within which the occurrence of liquefaction may impact surface improvements is generally identified as the upper 50 feet below the existing ground surface. Liquefaction potential is greater in saturated, loose, poorly graded fine sands with a mean (d_{50}) grain size in the range of 0.075 to 0.2 mm (Seed and Idriss, 1971). Non-sensitive clayey (cohesive) soils which possess a plasticity index of at least 18 (Bray and Sancio, 2006) are generally not considered to be susceptible to liquefaction, nor are those soils which are above the historic static groundwater table.

The Riverside County GIS website indicates that the subject site is located within a zone of moderate liquefaction susceptibility. Therefore, the scope of this investigation included a detailed liquefaction evaluation in order to determine the site-specific liquefaction potential.

Liquefaction is the loss of strength in generally cohesionless, saturated soils when the pore-water pressure induced in the soil by a seismic event becomes equal to or exceeds the overburden pressure. The primary factors which influence the potential for liquefaction include groundwater table elevation, soil type and plasticity characteristics, relative density of the soil, initial confining pressure, and intensity and duration of ground shaking. The depth within which the occurrence of liquefaction may impact surface improvements is generally identified as the upper 50 feet below the existing ground surface. Liquefaction potential is greater in saturated, loose, poorly graded fine sands with a mean (d_{50}) grain size in the range of 0.075 to 0.2 mm (Seed and Idriss, 1971). Non-sensitive clayey (cohesive) soils which possess a plasticity index of at least 18 (Bray

and Sancio, 2006) are generally not considered to be susceptible to liquefaction, nor are those soils which are above the historic static groundwater table.

The liquefaction analysis was conducted in accordance with the requirements of Special Publication 117A (CDMG, 2008), and currently accepted practice (SCEC, 1997). The liquefaction potential of the subject site was evaluated using the empirical method developed by Boulanger and Idriss (Boulanger and Idriss, 2008, 2014). This method predicts the earthquake-induced liquefaction potential of the site based on a given design earthquake magnitude and peak ground acceleration at the subject site. This procedure essentially compares the cyclic resistance ratio (CRR) [the cyclic stress ratio required to induce liquefaction for a cohesionless soil stratum at a given depth] with the earthquake-induced cyclic stress ratio (CSR) at that depth from a specified design earthquake (defined by a peak ground surface acceleration and an associated earthquake moment magnitude). CRR is determined as a function of the corrected SPT N-value $(N_1)_{60\text{-}cs}$, adjusted for fines content. The factor of safety against liquefaction is defined as CRR/CSR. Based on Special Publication 117A, a factor of safety of at least 1.3 is required in order to demonstrate that a given soil stratum is non-liquefiable. Additionally, in accordance with Special Publication 117A, clayey soils which do not meet the criteria for liquefiable soils defined by Bray and Sancio (2006), loose soils with a plasticity index (PI) less than 12 and moisture content greater than 85% of the liquid limit, are considered to be insusceptible to liquefaction. Non-sensitive soils with a PI greater than 18 are also considered non-liquefiable.

The liquefaction analysis procedure is tabulated on the spreadsheet forms included in Appendix F of this report. The liquefaction analysis was performed for Boring Nos. B-1, B-5 and B-9, which were advanced to depths of 50± feet. The liquefaction potential was analyzed at the boring locations utilizing a PGA_M of 0.550g related to a 6.97 magnitude seismic event. The liquefaction evaluation was performed using the reported high groundwater depth of 25 feet.

If liquefiable soils are identified, the potential settlements that could occur as a result of liquefaction are determined using the equation for volumetric strain due to post-cyclic reconsolidation (Yoshimine et. al, 2006). This procedure uses an empirical relationship between the induced cyclic shear strain and the corrected N-value to determine the expected volumetric strain of saturated sands subjected to earthquake shaking. This analysis is also documented on the spreadsheets included in Appendix F.

Conclusions and Recommendations

Potentially liquefiable soils were encountered at one of the 50±-foot deep boring locations. The potentially liquefiable soils were generally encountered at depths between 27 to 37± feet. The remaining soil strata encountered below the reported high groundwater table either possess factors of safety of 1.3 or greater and are considered non-liquefiable with respect to the requirements of Special Publication 117A. Settlement analyses were performed for the potentially liquefiable strata. The results of the settlement analyses indicate the following potential total deformations:

- Boring No. B-1: 0.00 inches
- Boring No. B-5: 0.54 inches
- Boring No. B-9: 0.80 inches

Based on the results of the settlement analyses, total dynamic settlements due to liquefaction are expected to range from 0.0 to 0.8± inches. The resulting differential settlements are expected to be on the order of ½± inches. The estimated differential settlement can be assumed to occur across a distance of 100 feet, indicating a maximum angular distortion of less than 0.001 inches per inch.

Based on our understanding of the proposed development, it is considered feasible to support the proposed structure on shallow foundations. Such a foundation system can be designed to resist the effects of the anticipated differential settlements, to the extent that the structure would not catastrophically fail. Designing the proposed structure to remain completely undamaged during a major seismic event is not considered to be economically feasible. Based on this understanding, the use of shallow foundation systems is considered to be the most economical means of supporting the proposed structure.

In order to support the proposed structure on shallow foundations (such as spread footings) the structural engineer should verify that the structure would not catastrophically fail due to the predicted dynamic differential settlements. Any utility connections to the structure should be designed to withstand the estimated differential settlements. It should also be noted that minor to moderate repairs, including re-leveling, restoration of utility connections, repair of damaged drywall and stucco, etc., would likely be required after occurrence of the liquefaction-induced settlements.

The use of a shallow foundation system, as described in this report, is typical for buildings of this type, where they are underlain by the extent of liquefiable soils encountered at this site. The post-liquefaction damage that could occur within the building proposed for this site will also be typical of similar buildings in the vicinity of this project. However, if the owner determines that this level of potential damage is not acceptable, other geotechnical and structural options are available, including the use of ground improvement techniques or mat foundations.

6.2 Geotechnical Design Considerations

General

The site is generally underlain by native alluvium at all of the boring locations. These soils possess variable densities, variable composition, and slightly porous soils were encountered at one of the boring locations. Based on these conditions, the near-surface alluvium, in their present condition, are not considered suitable for support of the foundations and floor slab of the new structure. Remedial grading will be necessary within the proposed building area to remove a portion of the near-surface alluvium, and to replace these soils as compacted structural fill.

As discussed in a previous section of this report, potentially liquefiable soils were identified at this site. The presence of the recommended layer of newly placed compacted structural fill above these liquefiable soils will help to reduce surface manifestations that could occur as a result of liquefaction. The foundation design recommendations presented in the subsequent sections of this report also contain recommendations to provide additional rigidity in order to reduce the potential effects of differential settlement that could occur as a result of liquefaction.

Settlement

Laboratory testing indicates that some of the near surface soils possess a potential for collapse when inundated with water. Some of these soils also possess a potential for consolidation when exposed to load increases in the range of those that will be exerted by the foundations of the new structure. The recommended remedial grading will remove most of these soils from within the zone of influence of the new foundations. The native alluvium that will remain in place below the recommended depth of overexcavation will not be significantly influenced by the foundation loads of the new structure. Provided that the recommended remedial grading is completed, the post construction settlements of the proposed structure are expected to be within tolerable limits.

Expansion

The near-surface soils at this site generally consist of silty sands, sandy silts, silty clays, and sandy clays. Laboratory testing indicates that the on-site soils possess medium expansion potential (EI=56). The foundation and floor slab design recommendations contained within this report are made in consideration of the expansion index test results. It is recommended that additional expansion index testing be conducted at the completion of rough grading to verify the expansion potential of the as-graded building pad.

Soluble Sulfates

The results of the soluble sulfate testing indicated sulfate concentrations of approximately 0.014 to 0.023 percent for the selected samples of the near-surface soils. These concentrations are considered to be "not applicable" (S0) with respect to the American Concrete Institute (ACI) Publication 318-14 Building Code Requirements for Structural Concrete and Commentary, Section 4.3. Therefore, specialized concrete mix designs are not considered to be necessary, with regard to sulfate protection purposes. It is, however, recommended that additional soluble sulfate testing be conducted at the completion of rough grading to verify the soluble sulfate concentrations of the soils which are present at pad grade within the building area.

Corrosion Potential

The results of laboratory testing indicate that the on-site soils possess saturated resistivity values of 840 and 960 ohm-cm, and a pH value of 7.8. These test results have been evaluated in accordance with guidelines published by the Ductile Iron Pipe Research Association (DIPRA). The DIPRA guidelines consist of a point system by which characteristics of the soils are used to quantify the corrosivity characteristics of the site. Resistivity and pH are two of the five factors that enter into the evaluation procedure. Redox potential, relative soil moisture content and sulfides are also included. Although sulfide testing was not part of the scope of services for this project, we have evaluated the corrosivity characteristics of the on-site soils using resistivity, pH and moisture content. Based on these factors, and utilizing the DIPRA procedure, **the on-site soils are considered to be highly corrosive to ductile iron pipe. Therefore, polyethylene encasement or some other appropriate method of protection will be required for iron pipes.**

Relatively low concentrations (22 and 77 mg/kg) of chlorides were detected in the samples submitted for corrosivity testing. In general, soils possessing chloride concentrations in excess of 500 parts per million (ppm) are considered to be corrosive with respect to steel reinforcement

within reinforced concrete. Based on the lack of any significant chlorides in the tested sample, the site is considered to have a C1 chloride exposure in accordance with the American Concrete Institute (ACI) Publication 318 Building Code Requirements for Structural Concrete and Commentary. Therefore, a specialized concrete mix design for reinforced concrete for protection against chloride exposure is not considered warranted.

Nitrates present in soil can be corrosive to copper tubing at concentrations greater than 50 mg/kg. The tested samples possess nitrate concentrations of 384 and 656 mg/kg. **Based on this test result, the on-site soils are considered to be corrosive to copper pipe.**

Since SCG does not practice in the area of corrosion engineering, we recommend that the client contact a corrosion engineer to provide a more thorough evaluation.

Shrinkage/Subsidence

Removal and recompaction of the artificial fill and near-surface native soils is estimated to result in an average shrinkage of 5 to 13 percent. Shrinkage estimates for the individual samples range between 0 and 22 percent based on the results of density testing and the assumption that the on-site soils will be compacted to about 92 percent of the ASTM D-1557 maximum dry density. It should be noted that the shrinkage estimate is based on the results of dry density testing performed on small-diameter samples of the existing soils taken at the boring locations. If a more accurate and precise shrinkage estimate is desired, SCG can perform a shrinkage study involving several excavated test-pits where in-place densities are determined using in-situ testing methods instead of laboratory density testing on small-diameter samples. Please contact SCG for details and a cost estimate regarding a shrinkage study, if desired.

Minor ground subsidence is expected to occur in the soils below the zone of removal, due to settlement and machinery working. The subsidence is estimated to be 0.1 to 0.15± feet. This estimate may be used for grading in areas that are underlain by native alluvial soils.

These estimates are based on previous experience and the subsurface conditions encountered at the boring locations. The actual amount of subsidence is expected to be variable and will be dependent on the type of machinery used, repetitions of use, and dynamic effects, all of which are difficult to assess precisely.

Existing Easement

An existing easement traverses the northeast corner of the project site. At the time of this report, it is unknown if a utility line or underground structure is located within this easement. If a high-pressure utility line or underground structure that will need to be protected is located within this easement, special design consideration may need to be taken. This may include, but not be limited to, construction of a "bridge" over the utility or structure, eliminating the drive lane in this area, or relocating the utility or structure.

Grading and Foundation Plan Review

No grading or foundation plans were available at the time of this report. It is therefore recommended that we be provided with copies of the preliminary plans, when they become

available, for review with regard to the conclusions, recommendations, and assumptions contained within this report.

6.3 Site Grading Recommendations

The grading recommendations presented below are based on the subsurface conditions encountered at the boring locations and our understanding of the proposed development. We recommend that all grading activities be completed in accordance with the Grading Guide Specifications included as Appendix D of this report, unless superseded by site-specific recommendations presented below.

Site Stripping

Initial site preparation should include stripping of any surficial vegetation and organic soils. Based on conditions encountered at the time of the subsurface exploration, stripping of native grass and weed growth is expected to be necessary throughout the majority of the site. These materials should be disposed of off-site. The actual extent of site stripping should be determined in the field by the geotechnical engineer, based on the organic content and stability of the materials encountered.

Treatment of Existing Soils: Building Pad

Remedial grading should be performed within the proposed building area in order to remove a portion of the near-surface alluvium soils. The existing soils within the proposed building area are recommended to be overexcavated to a depth of at least 4 feet below existing grade and to a depth of at least 4 feet below proposed building pad subgrade elevation, whichever is greater.

Where not encompassed within the general building pad overexcavations, additional overexcavation should be performed within the influence zones of the new foundations, to provide for a new layer of compacted structural fill extending to a depth of 4 feet below proposed bearing grade.

The overexcavation areas should extend at least 5 feet beyond the building foundations and perimeters. If the proposed structure incorporates any exterior columns (such as for a canopy or overhang) the area of overexcavation should also encompass these areas.

Following completion of the overexcavation, the subgrade soils within the building area should be evaluated by the geotechnical engineer to verify their suitability to serve as the structural fill subgrade, as well as to support the foundation loads of the new structures. This evaluation should include proofrolling and probing to identify any soft, loose or otherwise unstable soils that must be removed. Some localized areas of deeper excavation may be required if loose, porous, or low density native soils are encountered at the base of the overexcavation. **Zones of deeper excavations, extending to depths of 5 to 6± feet below existing site grades, may be required if loose soils are encountered at the base of the overexcavation.**

Based on the conditions encountered at one of the exploratory boring locations, some zones of very moist soils may be encountered in localized areas at or near the base of the recommended overexcavation. Stabilization of the exposed overexcavation subgrade

soils may be necessary. Where encountered at the boring locations, these very moist layers are generally underlain by drier alluvial soils, so it may be feasible to excavate the very moist soils to a layer of drier, more stable soils. Scarification and air drying of these "very moist" soils may also be sufficient to obtain a stable subgrade. However, if highly unstable soils are identified, and if the construction schedule does not allow for delays associated with drying, mechanical stabilization, usually consisting of coarse crushed stone or geotextile, could be necessary. In this event, the geotechnical engineer should be contacted for supplementary recommendations. Typically, an unstable subgrade can be stabilized using a suitable geotextile fabric, such as Mirafi RS580I, and/or a 12 to 18-inch thick layer of coarse (2 to 4-inch particle size) crushed stone. Crushed asphalt and concrete debris resultant from demolition could also be used as a subgrade stabilization material. Other options, including lime or cement treatment are also available.

After a suitable overexcavation subgrade has been achieved, the exposed soils should be scarified to a depth of at least 12 inches and moisture conditioned to achieve a moisture content of 2 to 4 percent above optimum moisture content. The subgrade soils should then be recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. The building pad area may then be raised to grade with previously excavated soils or imported structural fill.

Treatment of Existing Soils: Retaining Walls and Site Walls

The existing soils within the areas of any proposed retaining walls and non-retaining site walls should be overexcavated to a depth of 3 feet below foundation bearing grade and replaced as compacted structural fill, as discussed above for the proposed building pad. Any undocumented fill soils within any of these foundation areas should be removed in their entirety. The overexcavation areas should extend at least 5 feet beyond the foundation perimeters, and to an extent equal to the depth of fill below the new foundations. Any erection pads used to construct the walls are considered to be part of the foundation system with respect to these remedial grading recommendations. The overexcavation subgrade soils should be evaluated by the geotechnical engineer prior to scarifying, moisture conditioning, and recompacting the upper 12 inches of exposed subgrade soils. The previously excavated soils may then be replaced as compacted structural fill.

Please note that if the lateral and/or vertical extents of overexcavation are not achievable for the project retaining walls or site walls, then additional recommendations including, but not limited to reduced design bearing pressures may be required. Additionally, specialized grading techniques such as slot cutting or shoring may be required in order to facilitate construction.

Treatment of Existing Soils: Parking and Drive Areas

Based on economic considerations, overexcavation of the existing low strength alluvium in the new parking and drive areas is not considered warranted, with the exception of areas where lower strength or unstable soils are identified by the geotechnical engineer during grading.

Subgrade preparation in the new parking and drive areas should initially consist of removal of all soils disturbed during stripping operations. The geotechnical engineer should then evaluate the subgrade to identify any areas of additional unsuitable soils. The subgrade soils should then be scarified to a depth of 12± inches, moisture conditioned to 2 to 4 percent above optimum, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. Based on the presence of variable strength alluvial soils throughout the site, it is expected that some isolated

areas of additional overexcavation may be required to remove zones of lower strength, unsuitable soils.

The grading recommendations presented above for the proposed parking and drive areas assume that the owner and/or developer can tolerate minor amounts of settlement within the proposed parking areas. The grading recommendations presented above do not completely mitigate the extent of loose native soils in the parking areas. As such, settlement and associated pavement distress could occur. Typically, repair of such distressed areas involves significantly lower costs than completely mitigating these soils at the time of construction. If the owner cannot tolerate the risk of such settlements, the parking and drive areas should be overexcavated to a depth of 2 feet below proposed pavement subgrade elevation, with the resulting soils replaced as compacted structural fill.

Fill Placement

- Fill soils should be placed in thin (6± inches), near-horizontal lifts, moisture conditioned to within 2 to 4 percent above the optimum moisture content, and compacted.
- On-site soils may be used for fill provided they are cleaned of any debris to the satisfaction of the geotechnical engineer.
- All grading and fill placement activities should be completed in accordance with the requirements of the 2019 CBC and the grading code of the city of Perris.
- All fill soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density.
- Compaction tests should be performed periodically by the geotechnical engineer as random verification of compaction and moisture content. These tests are intended to aid the contractor. Since the tests are taken at discrete locations and depths, they may not be indicative of the entire fill and therefore should not relieve the contractor of his responsibility to meet the job specifications.

Imported Structural Fill

All imported structural fill should consist of low expansive (EI < 50), well graded soils possessing at least 10 percent fines (that portion of the sample passing the No. 200 sieve). Additional specifications for structural fill are presented in the Grading Guide Specifications, included as Appendix D.

Utility Trench Backfill

In general, all utility trench backfill soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. It is recommended that materials in excess of 3 inches in size not be used for utility trench backfill. Compacted trench backfill should conform to the requirements of the local grading code, and more restrictive requirements may be indicated by city of Perris. All utility trench backfills should be witnessed by the geotechnical engineer. The trench backfill soils should be compaction tested where possible; probed and visually evaluated elsewhere.

Utility trenches which parallel a footing, and extending below a 1h:1v plane projected from the outside edge of the footing should be backfilled with structural fill soils, compacted to at least 90 percent of the ASTM D-1557 standard. Pea gravel backfill should not be used for these trenches.

6.4 Construction Considerations

Excavation Considerations

The near surface soils are predominately granular in composition. These materials will likely be subject to caving within shallow excavations. Where caving occurs within shallow excavations, flattened excavation slopes may be sufficient to provide excavation stability. On a preliminary basis, the inclination of temporary slopes for the onsite clayey soils should not exceed 2h:1v. Maintaining adequate moisture content within the near-surface soils will improve excavation stability. All excavation activities on this site should be conducted in accordance with Cal-OSHA regulations.

Moisture Sensitive Subgrade Soils

The near surface soils include appreciable silt and clay content that will become unstable if exposed to significant moisture infiltration or disturbance by construction traffic. If grading occurs during a period of relatively wet weather, an increase in subgrade instability should also be expected. The site should, therefore, be graded to prevent ponding of surface water and to prevent water from running into excavations.

As discussed in Section 6.3 of this report, unstable subgrade soils may be encountered in localized areas at the base of the overexcavation within the proposed building area. The extent of unstable subgrade soils will to a large degree depend on methods used by the contractor to avoid adding additional moisture to these soils or disturbing soils which already possess high moisture contents. If grading occurs during a period of relatively wet weather, an increase in subgrade instability should also be expected. Due to the potential for subgrade instability, it may be necessary that only tracked vehicles be utilized for grading or construction activities that require traffic over the exposed subgrade soils, depending on the stability of the overexcavation subgrade.

Three samples of the near-surface soils (Boring No. B-1 at a depth of 3½ to 5± feet and 6 to 7½± feet, and B-8 at 6½ to 8½± feet) possesses moisture contents well over the optimum for recompaction. Allowances should be made for costs and delays associated with drying the very moist on-site soils or the import of a drier, less moisture sensitive fill material. Grading during wet or cool weather may also increase the depth of overexcavation in the pad area as well as the need for and/or the thickness of the crushed stone stabilization layer, discussed in Section 6.3 of this report.

Expansive Soils

Some of the near surface soils have been determined to possess medium expansion potentials. Therefore, care should be given to proper moisture conditioning of all building pad subgrade soils to a moisture content of 2 to 4 percent above the Modified Proctor optimum during site grading. All imported fill soils should have low expansive (EI < 50) characteristics. **In addition to adequately moisture conditioning the subgrade soils and fill soils during grading, special care must be taken to maintain moisture content of these soils at 2 to 4 percent above the Modified Proctor optimum. This will require the contractor to frequently moisture condition these soils throughout the grading process, unless grading occurs during a period of relatively wet weather**.

Due to the presence of expansive soils at this site, provisions should be made to limit the potential for surface water to penetrate the soils immediately adjacent to the structures. These provisions should include directing surface runoff into rain gutters and area drains, reducing the extent of landscaped areas around the structure, and sloping the ground surface away from the building. Where possible, it is recommended that landscaped planters not be located immediately adjacent to the building. If landscaped planters around the buildings are necessary, it is recommended that drought tolerant plants or a drip irrigation system be utilized, to minimize the potential for deep moisture penetration around the structures. Presented below is a list of additional soil moisture control recommendations that should be considered by the owner, developer, and civil engineer:

- Ponding and areas of low flow gradients in unpaved walkways, grass and planter areas should be avoided. In general, minimum drainage gradients of 2 percent should be maintained in unpaved areas.
- Bare soil within five feet of proposed structures should be sloped at a minimum five percent gradient away from the structures (about three inches of fall in five feet), or the same area could be paved with a minimum surface gradient of one percent. Pavement is preferable.
- Decorative gravel ground cover tends to provide a reservoir for surface water and may hide areas of ponding or poor drainage. Decorative gravel is, therefore, not recommended and should not be utilized for landscaping unless equipped with a subsurface drainage system designed by a licensed landscape architect.
- Positive drainage devices, such as graded swales, paved ditches, and catch basins should be installed at appropriate locations within the area of proposed development.
- Concrete walks and flatwork should not obstruct the free flow of surface water to the appropriate drainage devices.
- Area drains should be recessed below grade to allow free flow of water into the drain. Concrete or brick flatwork joints should be sealed with mortar or flexible mastic.
- Gutter and downspout systems should be installed to capture all discharge from roof areas. Downspouts should discharge directly into a pipe or paved surface system to be conveyed offsite.
- Enclosed planters adjoining, or in close proximity to proposed structures, should be sealed at the bottom and provided with subsurface collection systems and outlet pipes.
- Depressed planters should be raised with soil to promote runoff (minimum drainage gradient two percent or five percent, see above), and/or equipped with area drains to eliminate ponding.
- Drainage outfall locations should be selected to avoid erosion of slopes and/or properly armored to prevent erosion of graded surfaces. No drainage should be directed over or towards adjoining slopes.
- All drainage devices should be maintained on a regular basis, including frequent observations during the rainy season to keep the drains free of leaves, soil and other debris.
- Landscape irrigation should conform to the recommendations of the landscape architect and should be performed judiciously to preclude either soaking or excessive drying of the foundation soils. This should entail regular watering during the drier portions of the year and little or no irrigation during the rainy season. Automatic sprinkler systems should, therefore, be switched to manual operation during the rainy season. Good irrigation practice typically requires frequent application of limited quantities of water that are sufficient to sustain plant growth, but do not excessively wet the soils. Ponding and/or run-off of irrigation water are indications of excessive watering.

Other provisions, as determined by the landscape architect or civil engineer, may also be appropriate.

Groundwater

Ground water table was considered to be present at depths of 27 to 30± feet at the boring locations, at the time of subsurface exploration. Groundwater is therefore not expected to impact the grading or foundation construction activities.

6.5 Foundation Design and Construction

Based on the preceding grading recommendations, it is assumed that the new building pad will be underlain by structural fill soils used to replace near-surface alluvial soils. These new structural fill soils are expected to extend to depths of at least 4 feet below proposed foundation bearing grades, underlain by 1± foot of additional soil that has been densified and moisture conditioned in place. Based on this subsurface profile, and based on the design considerations presented in Section 6.1 of this report, the proposed structure may be supported on conventional shallow foundations.

Foundation Design Parameters

New square and rectangular footings may be designed as follows:

- Maximum, net allowable soil bearing pressure: 2,500 lbs/ft^2.
- Minimum wall/column footing width: 14 inches/24 inches.
- Minimum longitudinal steel reinforcement within strip footings: Six (6) No. 5 rebars (3 top and 3 bottom) in strip footings, due to the presence of expansive and potentially liquefiable soils.
- Minimum foundation embedment: 12 inches into suitable structural fill soils, and at least 18 inches below adjacent exterior grade. Interior column footings may be placed immediately beneath the floor slab.
- It is recommended that the perimeter building foundations be continuous across all exterior doorways. Any flatwork adjacent to the exterior doors should be doweled into the perimeter foundations in a manner determined by the structural engineer.

The allowable bearing pressures presented above may be increased by 1/3 when considering short duration wind or seismic loads. The minimum steel reinforcement recommended above is based on standard geotechnical practice. Additional rigidity may be necessary for structural considerations, or to resist the effects of the liquefaction-induced differential settlements, as discussed in Section 6.1. The actual design of the foundations should be determined by the structural engineer.

Foundation Construction

The foundation subgrade soils should be evaluated at the time of overexcavation, as discussed in Section 6.3 of this report. It is further recommended that the foundation subgrade soils be evaluated by the geotechnical engineer immediately prior to steel or concrete placement. Soils

suitable for direct foundation support should consist of newly placed structural fill, compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Any unsuitable materials should be removed to a depth of suitable bearing compacted structural fill, with the resulting excavations backfilled with compacted fill soils. As an alternative, lean concrete slurry (500 to 1,500 psi) may be used to backfill such isolated overexcavations.

The foundation subgrade soils should also be properly moisture conditioned to 2 to 4 percent above the Modified Proctor optimum, to a depth of at least 12 inches below bearing grade. Since it is typically not feasible to increase the moisture content of the floor slab and foundation subgrade soils once rough grading has been completed, care should be taken to maintain the moisture content of the building pad subgrade soils throughout the construction process.

Estimated Foundation Settlements

Post-construction total and differential settlements of shallow foundations designed and constructed in accordance with the previously presented recommendations are estimated to be less than 1.0 and 0.5 inches, respectively. Differential movements are expected to occur over a 50-foot span, thereby resulting in an angular distortion of less than 0.002 inches per inch. These settlements are in addition to the liquefaction-induced settlements previously discussed in Section 6.1 of this report.

Lateral Load Resistance

Lateral load resistance will be developed by a combination of friction acting at the base of foundations and slabs and the passive earth pressure developed by footings below grade. The following friction and passive pressure may be used to resist lateral forces:

- Passive Earth Pressure: 250 lbs/ft^3
- Friction Coefficient: 0.25

These are allowable values, and include a factor of safety. When combining friction and passive resistance, the passive pressure component should be reduced by one-third. These values assume that footings will be poured directly against compacted structural fill. The maximum allowable passive pressure is 2,500 lbs/ft^2.

6.6 Floor Slab Design and Construction

Subgrades which will support new floor slab should be prepared in accordance with the recommendations contained in the ***Site Grading Recommendations*** section of this report. Based on the anticipated grading which will occur at this site, the floor of the new structure may be constructed as a conventional slab-on-grade supported on newly placed structural fill soils. These fill soils are expected to extend to a depth of at least 4 feet below finished pad grade. Based on geotechnical considerations, the floor slab may be designed as follows:

- Minimum slab thickness: 6 inches.

- Modulus of subgrade reaction: k = 100 psi/in

- Minimum slab reinforcement: No. 3 bars at 18-inches on-center, in both directions, due to the presence of medium expansive soils at this site. The actual floor slab reinforcement should be determined by the structural engineer, based upon the imposed loading.

- Slab underlayment: If moisture sensitive floor coverings will be used the minimum slab underlayment should consist of a moisture vapor barrier constructed below the entire area where such moisture sensitive floor coverings are anticipated. The moisture vapor barrier should meet or exceed the Class A rating as defined by ASTM E 1745-97 and have a permeance rating less than 0.01 perms as described in ASTM E 96-95 and ASTM E 154-88. A polyolefin material such as Stego® Wrap Vapor Barrier or equivalent will meet these specifications. The moisture vapor barrier should be properly constructed in accordance with all applicable manufacturer specifications. The need for sand and/or the amount of sand above the moisture vapor barrier should be specified by the structural engineer or concrete contractor. The selection of sand above the barrier is not a geotechnical engineering issue and hence outside our purview.

- Moisture condition the floor slab subgrade soils to 2 to 4 percent above the Modified Proctor optimum moisture content, to a depth of 12 inches. The moisture content of the floor slab subgrade soils should be verified by the geotechnical engineer within 24 hours prior to concrete placement.

- Proper concrete curing techniques should be utilized to reduce the potential for slab curling or the formation of excessive shrinkage cracks.

The actual design of the floor slabs should be completed by the structural engineer to verify adequate thickness and reinforcement.

6.7 Retaining Wall Design and Construction

Small retaining walls are expected to be necessary in the area of the new truck loading docks and may also be required to facilitate the new site grades. The parameters recommended for use in the design of these walls are presented below.

Retaining Wall Design Parameters

Based on the soil conditions encountered at the boring locations, the following parameters may be used in the design of new retaining walls for this site. We have provided parameters assuming the use of on-site soils for retaining wall backfill. The on-site soils generally consist of silty sands, sandy silts, clayey sands and sandy clays. Based on their classifications, the on-site soils consisting of silty sands and sandy silts are generally expected to possess a friction angle of at least 30 degrees when compacted to 90 percent of the ASTM-1557 maximum dry density. **However, clayey sands and sandy clay soils should not be used for backfilling of retaining walls. These clayey soils likely possess higher expansion potential and lower strengths than the majority of the near-surface soils at the site.**

If desired, SCG could provide design parameters for an alternative select backfill material behind the retaining walls. The use of select backfill material could result in lower lateral earth pressures. In order to use the design parameters for the imported select fill, this material must be placed

within the entire active failure wedge. This wedge is defined as extending from the heel of the retaining wall upwards at an angle of approximately 60° from horizontal. If select backfill material behind the retaining wall is desired, SCG should be contacted for supplementary recommendations.

RETAINING WALL DESIGN PARAMETERS

Design Parameter		Soil Type
		On-Site Imported Sands and Silty Sands
Internal Friction Angle (ϕ)		30°
Unit Weight		125 lbs/ft^3
Equivalent Fluid Pressure:	Active Condition (level backfill)	42 lbs/ft^3
	Active Condition (2h:1v backfill)	67 lbs/ft^3
	At-Rest Condition (level backfill)	63 lbs/ft^3

The walls should be designed using a soil-footing coefficient of friction of 0.25 and an equivalent passive pressure of 250 lbs/ft^3. The structural engineer should incorporate appropriate factors of safety in the design of the retaining walls.

The active earth pressure may be used for the design of retaining walls that do not directly support structures or support soils that in turn support structures and which will be allowed to deflect. The at-rest earth pressure should be used for walls that will not be allowed to deflect such as those which will support foundation bearing soils, or which will support foundation loads directly.

Where the soils on the toe side of the retaining wall are not covered by a "hard" surface such as a structure or pavement, the upper 1 foot of soil should be neglected when calculating passive resistance due to the potential for the material to become disturbed or degraded during the life of the structure.

Retaining Wall Foundation Design

The retaining wall foundations should be supported within newly placed structural fill, extending to a depth of at least 3 feet below the proposed bearing grade. Foundations to support new retaining walls should be designed in accordance with the general Foundation Design Parameters presented in a previous section of this report.

Seismic Lateral Earth Pressures

In accordance with the 2019 CBC, any retaining walls more than 6 feet in height must be designed for seismic lateral earth pressures. If walls 6 feet or more are required for this site, the geotechnical engineer should be contacted for supplementary seismic lateral earth pressure recommendations.

Backfill Material

On-site soils may be used to backfill the retaining walls. However, all backfill material placed within 3 feet of the back wall face should have a particle size no greater than 3 inches. The retaining wall backfill materials should be well graded.

It is recommended that a properly installed prefabricated drainage composite such as the MiraDRAIN 6000XL (or approved equivalent), which is specifically designed for use behind retaining walls, be placed against the face on the back side of the retaining walls. This material should extend from the top of the retaining wall footing to within 1 foot of the ground surface on the back side of the retaining wall. A 12-inch thick layer of a low permeability soil should be placed over the backfill to reduce surface water migration to the underlying soils.

All retaining wall backfill should be placed and compacted under engineering-controlled conditions in the necessary layer thicknesses to ensure an in-place density between 90 and 93 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D1557-91). Care should be taken to avoid over-compaction of the soils behind the retaining walls, and the use of heavy compaction equipment should be avoided.

Subsurface Drainage

As previously indicated, the retaining wall design parameters are based upon drained backfill conditions. Consequently, some form of permanent drainage system will be necessary in conjunction with the appropriate backfill material. Subsurface drainage may consist of either:

- A weep hole drainage system typically consisting of a series of 2-inch diameter holes in the wall situated slightly above the ground surface elevation on the exposed side of the wall and at an approximate 10-foot on-center spacing. Alternatively, 4-inch diameter holes at an approximate 20-foot on-center spacing can be used for this type of drainage system. In addition, the weep holes should include a 2 cubic foot pocket of open graded gravel, surrounded by an approved geotextile fabric, at each weep hole location.

- A 4-inch diameter perforated pipe surrounded by 2 cubic feet of gravel per linear foot of drain placed behind the wall, above the retaining wall footing. The gravel layer should be wrapped in a suitable geotextile fabric to reduce the potential for migration of fines. The footing drain should be extended to daylight or tied into a storm drainage system. The actual design of this type of system should be determined by the civil engineer to verify that the drainage system possesses the adequate capacity and slope for its intended use.

Weep holes or a footing drain will not be required for building stem walls.

6.8 Pavement Design Parameters

Site preparation in the pavement area should be completed as previously recommended in the ***Site Grading Recommendations*** section of this report. The subsequent pavement recommendations assume proper drainage and construction monitoring, and are based on either PCA or CALTRANS design parameters for a twenty (20) year design period. However, these

designs also assume a routine pavement maintenance program to obtain the anticipated 20-year pavement service life.

Pavement Subgrades

It is anticipated that the new pavements will be primarily supported on a layer of compacted structural fill, consisting of scarified, thoroughly moisture conditioned and recompacted existing soils. The on-site soils generally consist of silty sands, sandy silts, clayey sands, and sandy clays. These materials are expected to exhibit fair to good pavement support characteristics, with estimated R-values between 20 and 40. Therefore the subsequent pavement design is based upon a conservative R-value of 20. Any fill material imported to the site should have support characteristics equal to or greater than that of the on-site soils and be placed and compacted under engineering-controlled conditions. It is recommended that additional R-value testing be performed after completion of rough grading to verify the pavement support characteristics of the pavement subgrades following site grading.

Asphaltic Concrete

Presented below are the recommended thicknesses for new flexible pavement structures consisting of asphaltic concrete over a granular base. The pavement designs are based on the traffic indices (TI's) indicated. The client and/or civil engineer should verify that these TI's are representative of the anticipated traffic volumes. If the client and/or civil engineer determine that the expected traffic volume will exceed the applicable traffic index, we should be contacted for supplementary recommendations. The design traffic indices equate to the following approximate daily traffic volumes over a 20 year design life, assuming six operational traffic days per week.

Traffic Index	No. of Heavy Trucks per Day
4.0	0
5.0	1
6.0	3
7.0	11
8.0	35

For the purpose of the traffic volumes indicated above, a truck is defined as a 5-axle tractor trailer unit with one 8-kip axle and two 32-kip tandem axles. All of the traffic indices allow for 1,000 automobiles per day.

ASPHALT PAVEMENTS (R=20)					
Materials	**Thickness (inches)**				
	Auto Parking and Auto Drive Lanes (TI = 4.0 to 5.0)	Truck Traffic			
		TI = 6.0	TI = 7.0	TI = 8.0	TI = 9.0
Asphalt Concrete	3	3½	4	5	5½
Aggregate Base	8	10	12	14	16
Compacted Subgrade	12	12	12	12	12

The aggregate base course should be compacted to at least 95 percent of the ASTM D-1557 maximum dry density. The asphaltic concrete should be compacted to at least 95 percent of the Marshall maximum density, as determined by ASTM D-2726. The aggregate base course may consist of crushed aggregate base (CAB) or crushed miscellaneous base (CMB), which is a recycled gravel, asphalt and concrete material. The gradation, R-Value, Sand Equivalent, and Percentage Wear of the CAB or CMB should comply with appropriate specifications contained in the current edition of the "Greenbook" Standard Specifications for Public Works Construction.

Portland Cement Concrete

The preparation of the subgrade soils within concrete pavement areas should be performed as previously described for proposed asphalt pavement areas. The minimum recommended thicknesses for the Portland Cement Concrete pavement sections are as follows:

PORTLAND CEMENT CONCRETE PAVEMENTS (R=20)				
Materials	**Thickness (inches)**			
	Autos and Light Truck Traffic (TI = 6.0)	Truck Traffic		
		TI = 7.0	TI = 8.0	TI = 9.0
PCC	5	5½	7	8½
Compacted Subgrade (95% minimum compaction)	12	12	12	12

The concrete should have a 28-day compressive strength of at least 3,000 psi. The maximum joint spacing within all of the PCC pavements is recommended to be equal to or less than 30 times the pavement thickness.

7.0 GENERAL COMMENTS

This report has been prepared as an instrument of service for use by the client, in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, civil engineer, and/or structural engineer. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur. The client(s)' reliance upon this report is subject to the Engineering Services Agreement, incorporated into our proposal for this project.

The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between boring locations and sample depths. If the conditions encountered during construction vary significantly from those detailed herein, we should be contacted immediately to determine if the conditions alter the recommendations contained herein.

This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to verify that they do not affect the conclusions and recommendations contained herein. We also recommend that the project plans and specifications be submitted to our office for review to verify that our recommendations have been correctly interpreted.

The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

8.0 REFERENCES

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National Research Council (NRC), "Liquefaction of Soils During Earthquakes," Committee on Earthquake Engineering, National Research Council, Washington D. C., Report No. CETS-EE-001, 1985.

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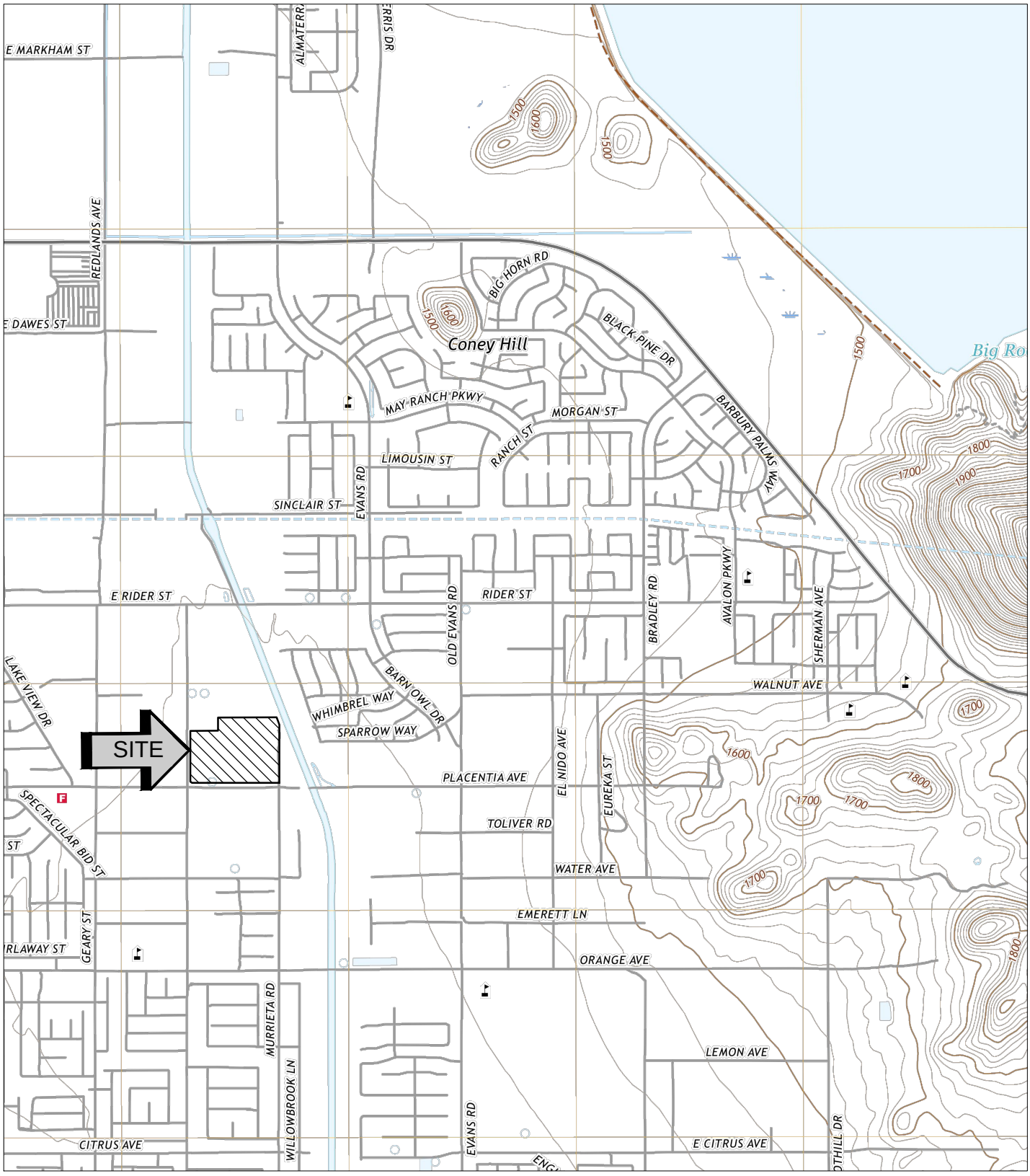
Southern California Earthquake Center (SCEC), University of Southern California, "Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction in California," Committee formed 1997.

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Youd, T. L. and Idriss, I. M. (Editors), "Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils," Salt Lake City, UT, January 5-6 1996, NCEER Technical Report NCEER-97-0022, Buffalo, NY.

APPENDIX A



SOURCE: USGS TOPOGRAPHIC MAP OF THE PERRIS QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA, 2018.

SITE LOCATION MAP

PROPOSED WAREHOUSE

PERRIS, CALIFORNIA

SCALE: 1" = 2000'	
DRAWN: MD CHKD: RGT	
SCG PROJECT 21G147-3	
PLATE 1	

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



GEOTECHNICAL LEGEND

- APPROXIMATE ADDITIONAL BORING LOCATION
- PREVIOUS BORING LOCATION (SCG PROJECT NO. 21G147-1)
- PREVIOUS INFILTRATION TEST LOCATION (SCG PROJECT NO. 21G147-2)

NOTE: SITE PLAN PREPARED BY RGA.

ADDITIONAL BORING LOCATION PLAN

NEC PLACENTIA AVENUE/WILSON AVENUE

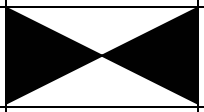
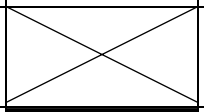
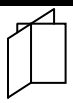
PERRIS, CALIFORNIA

SCALE: 1" = 120'	
DRAWN: JAZ CHKD: RGT	
SCG PROJECT 21G147-3	
PLATE 2	

SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX B

BORING LOG LEGEND

SAMPLE TYPE	GRAPHICAL SYMBOL	SAMPLE DESCRIPTION
AUGER		SAMPLE COLLECTED FROM AUGER CUTTINGS, NO FIELD MEASUREMENT OF SOIL STRENGTH. (DISTURBED)
CORE		ROCK CORE SAMPLE: TYPICALLY TAKEN WITH A DIAMOND-TIPPED CORE BARREL. TYPICALLY USED ONLY IN HIGHLY CONSOLIDATED BEDROCK.
GRAB		SOIL SAMPLE TAKEN WITH NO SPECIALIZED EQUIPMENT, SUCH AS FROM A STOCKPILE OR THE GROUND SURFACE. (DISTURBED)
CS		CALIFORNIA SAMPLER: 2-1/2 INCH I.D. SPLIT BARREL SAMPLER, LINED WITH 1-INCH HIGH BRASS RINGS. DRIVEN WITH SPT HAMMER. (RELATIVELY UNDISTURBED)
NSR		NO RECOVERY: THE SAMPLING ATTEMPT DID NOT RESULT IN RECOVERY OF ANY SIGNIFICANT SOIL OR ROCK MATERIAL.
SPT		STANDARD PENETRATION TEST: SAMPLER IS A 1.4 INCH INSIDE DIAMETER SPLIT BARREL, DRIVEN 18 INCHES WITH THE SPT HAMMER. (DISTURBED)
SH		SHELBY TUBE: TAKEN WITH A THIN WALL SAMPLE TUBE, PUSHED INTO THE SOIL AND THEN EXTRACTED. (UNDISTURBED)
VANE		VANE SHEAR TEST: SOIL STRENGTH OBTAINED USING A 4 BLADED SHEAR DEVICE. TYPICALLY USED IN SOFT CLAYS-NO SAMPLE RECOVERED.

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

BLOW COUNT: Number of blows required to advance the sampler 12 inches using a 140 lb hammer with a 30-inch drop. 50/3" indicates penetration refusal (>50 blows) at 3 inches. WH indicates that the weight of the hammer was sufficient to push the sampler 6 inches or more.

POCKET PEN.: Approximate shear strength of a cohesive soil sample as measured by pocket penetrometer.

GRAPHIC LOG: Graphic Soil Symbol as depicted on the following page.

DRY DENSITY: Dry density of an undisturbed or relatively undisturbed sample in lbs/ft^3.

MOISTURE CONTENT: Moisture content of a soil sample, expressed as a percentage of the dry weight.

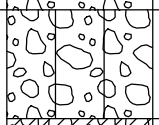
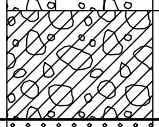
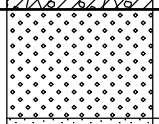
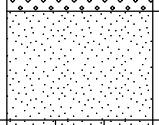
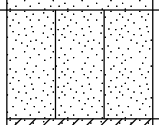
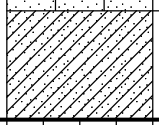
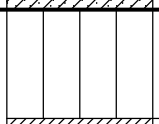
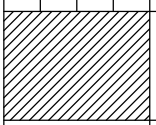
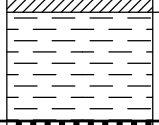
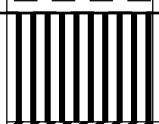
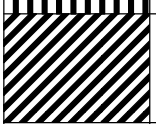
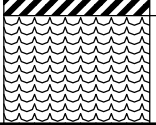
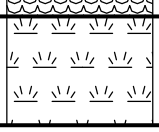
LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

PLASTIC LIMIT: The moisture content above which a soil behaves as a plastic.

PASSING #200 SIEVE: The percentage of the sample finer than the #200 standard sieve.

UNCONFINED SHEAR: The shear strength of a cohesive soil sample, as measured in the unconfined state.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-8

JOB NO.: 21G147-3
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 7/22/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jose Zuniga

WATER DEPTH: Dry
CAVE DEPTH: 16 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		23			ALLUVIUM: Gray Brown Silty fine Sand, slightly cemented, trace calcareous veining, medium dense-moist	101	9					
		19			Light Brown to Brown Clayey fine Sand, trace to little calcareous veining, loose to medium dense-moist to very moist	94	11					
5		9				90	16					
		15	2.0		Light Gray Silty Clay to Clayey Silt, abundant calcareous veining, stiff-very moist	94	20					
		22			Brown Silty fine Sand, trace Clay, abundant calcareous veining, medium dense-moist	100	8					
10												
		24			Brown Clayey fine Sand, trace medium Sand, cemented, trace calcareous veining, medium dense to dense-moist to very moist		10					
15												
		50					16					
20					Boring Terminated at 20'							

TBL 21G147-3.GPJ SOCALGEO.GDT 8/20/21

TEST BORING LOG

PLATE B-1

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-9

JOB NO.: 21G147-3
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 7/22/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jose Zuniga

WATER DEPTH: 30 feet
CAVE DEPTH: 25 feet
READING TAKEN: 20 minutes after Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					ALLUVIUM: Light Brown Silty fine Sand, trace calcareous veining, medium dense-damp							
		24				97	5					
		33				94	6					
					Light Gray Brown Silty fine Sand, slightly porous, slightly cemented, abundant calcareous veining, loose to medium dense-damp							
5		15				102	6					
					Brown Clayey fine Sand, slightly cemented, trace calcareous veining, medium dense-damp to moist							
		22				98	12					
		36				127	6					
10												
		24					9					
15												
		23					11					
20												
					Brown Silty fine Sand, trace Iron oxide staining, medium dense to dense-moist to very moist							
		47					8			35		
25												
		16					15			47		

TBL 21G147-3.GPJ SOCALGEO.GDT 8/20/21

TEST BORING LOG

PLATE B-2a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-9

JOB NO.: 21G147-3
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 7/22/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jose Zuniga

WATER DEPTH: 30 feet
CAVE DEPTH: 25 feet
READING TAKEN: 20 minutes after Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Brown Silty fine Sand, trace Iron oxide staining, medium dense to dense-damp to wet							Groundwater @ 30 feet, during drilling
35		17					13			44		
					Brown Silty fine to medium Sand, trace Clay, micaceous, dense-wet							
		31					13			20		
40												
					Brown fine to medium Sand, trace coarse Sand, some Silt, very dense-wet							
		51					10			17		
45												
					Brown Silty fine Sand, dense-wet							
		34					14			40		
50												
					Boring Terminated at 50'							

TBL 21G147-3.GPJ SOCALGEO.GDT 8/20/21

TEST BORING LOG

PLATE B-2b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-10

JOB NO.: 21G147-3
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 7/22/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jose Zuniga

WATER DEPTH: Dry
CAVE DEPTH: 7 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		8			ALLUVIUM: Brown to Light Brown Silty fine Sand, trace to little calcareous veining, loose to medium dense-damp		7					
		22					7					
5		23			Light Brown fine Sandy Silt, abundant calcareous veining, medium dense-very moist		15					
		13					15					
10					Boring Terminated at 10'							

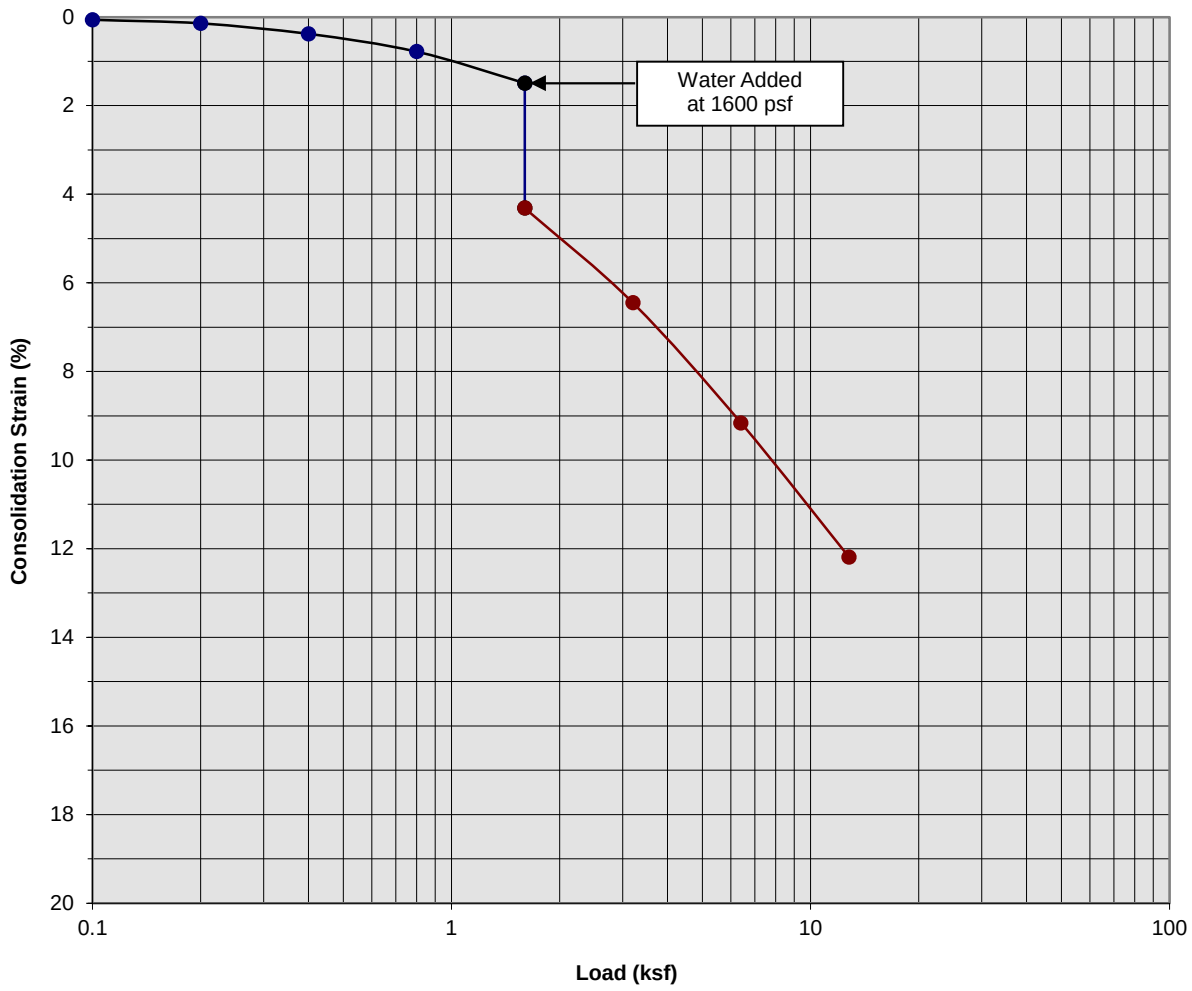
TBL 21G147-3.GPJ SOCALGEO.GDT 8/20/21

TEST BORING LOG

PLATE B-3

APPENDIX C

Consolidation/Collapse Test Results



Classification: Gray Brown Silty fine Sand

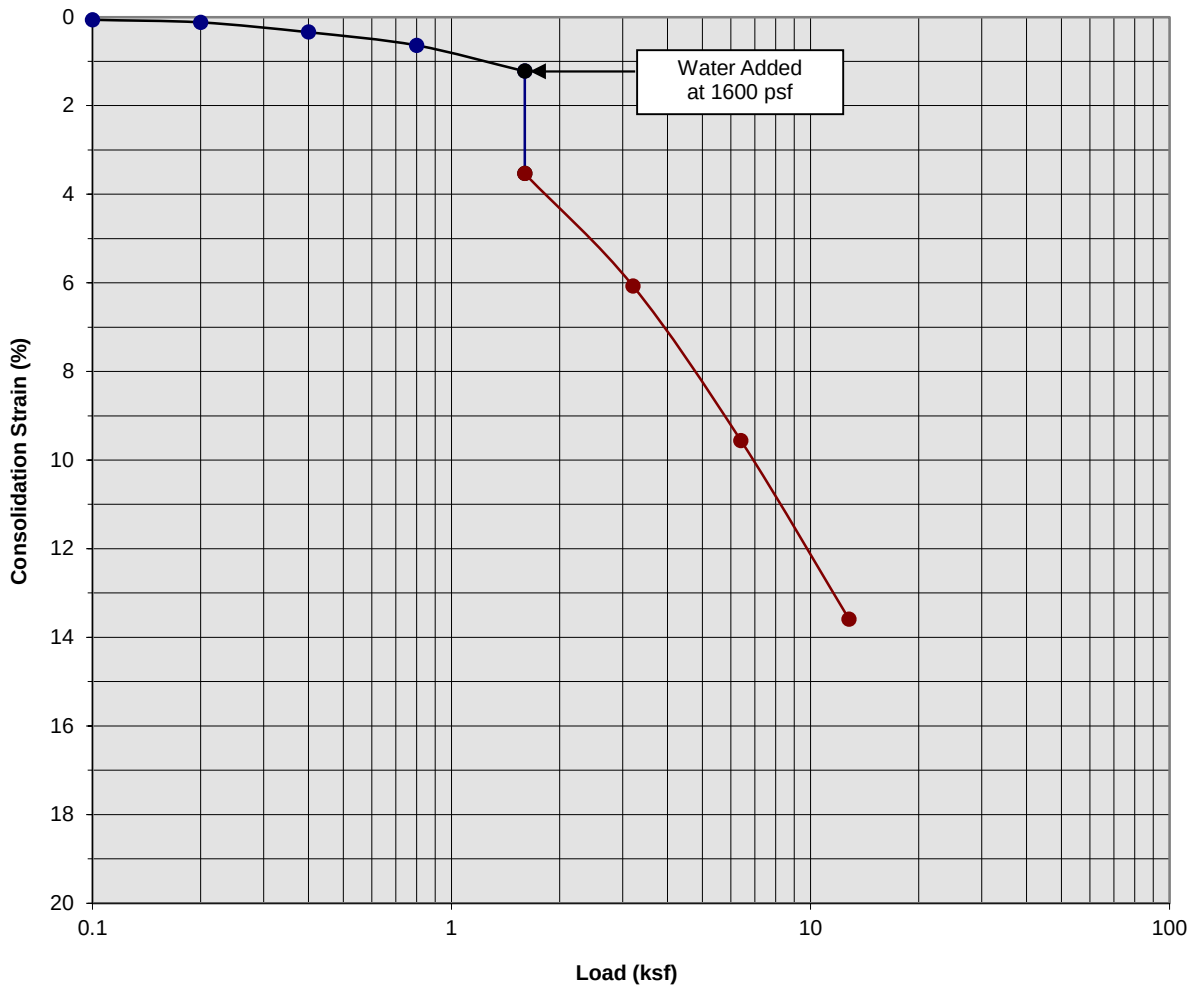
Boring Number:	B-8	Initial Moisture Content (%)	9
Sample Number:	---	Final Moisture Content (%)	18
Depth (ft)	1 to 2	Initial Dry Density (pcf)	101.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	115.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	2.82

Proposed Warehouse
Perris, CA
Project No. 21G147-3

PLATE C- 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: Light Brown to Brown Clayey fine Sand

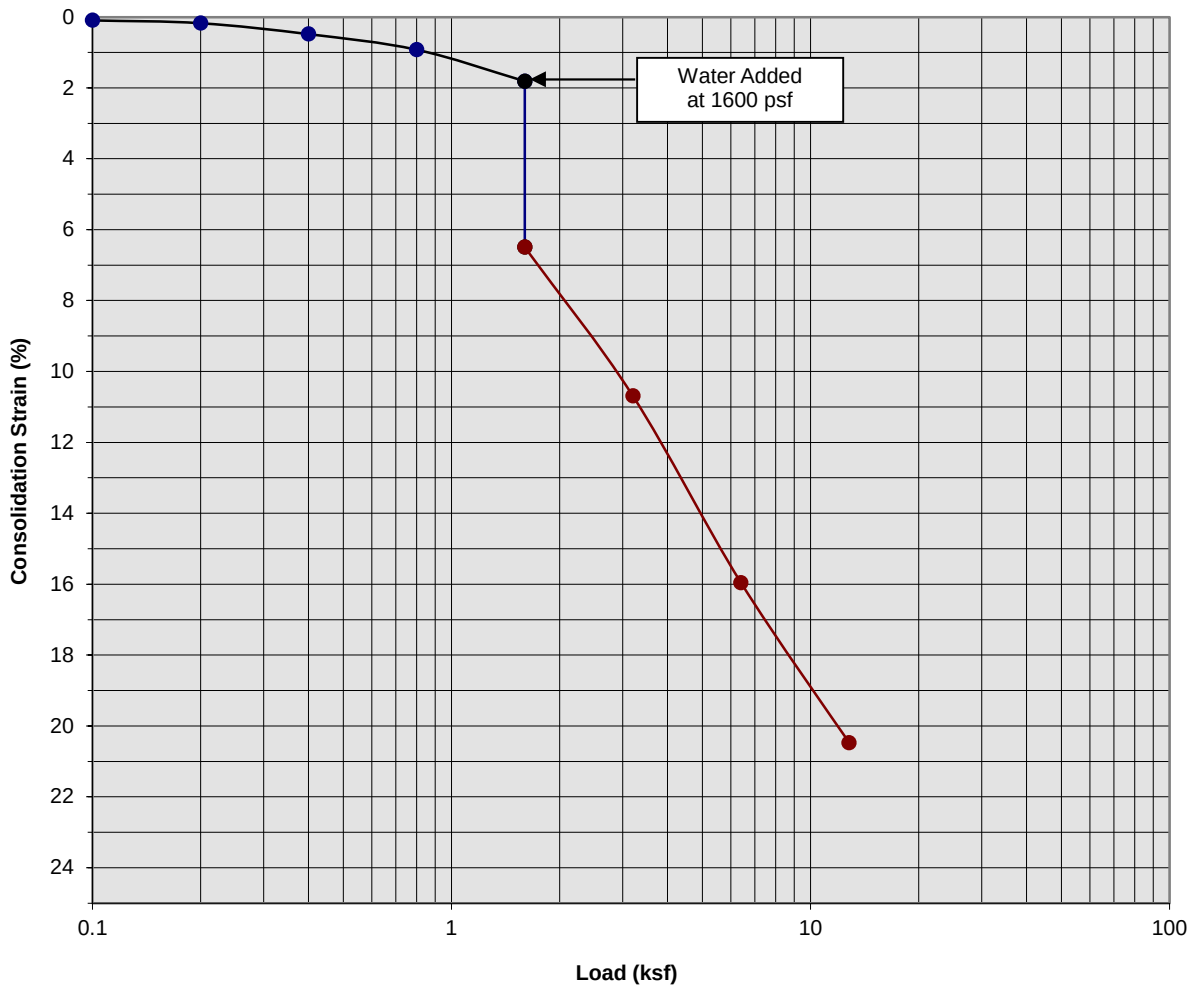
Boring Number:	B-8	Initial Moisture Content (%)	11
Sample Number:	---	Final Moisture Content (%)	21
Depth (ft)	3 to 4	Initial Dry Density (pcf)	94.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	108.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	2.31

Proposed Warehouse
Perris, CA
Project No. 21G147-3

PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: Light Brown to Brown Clayey fine Sand

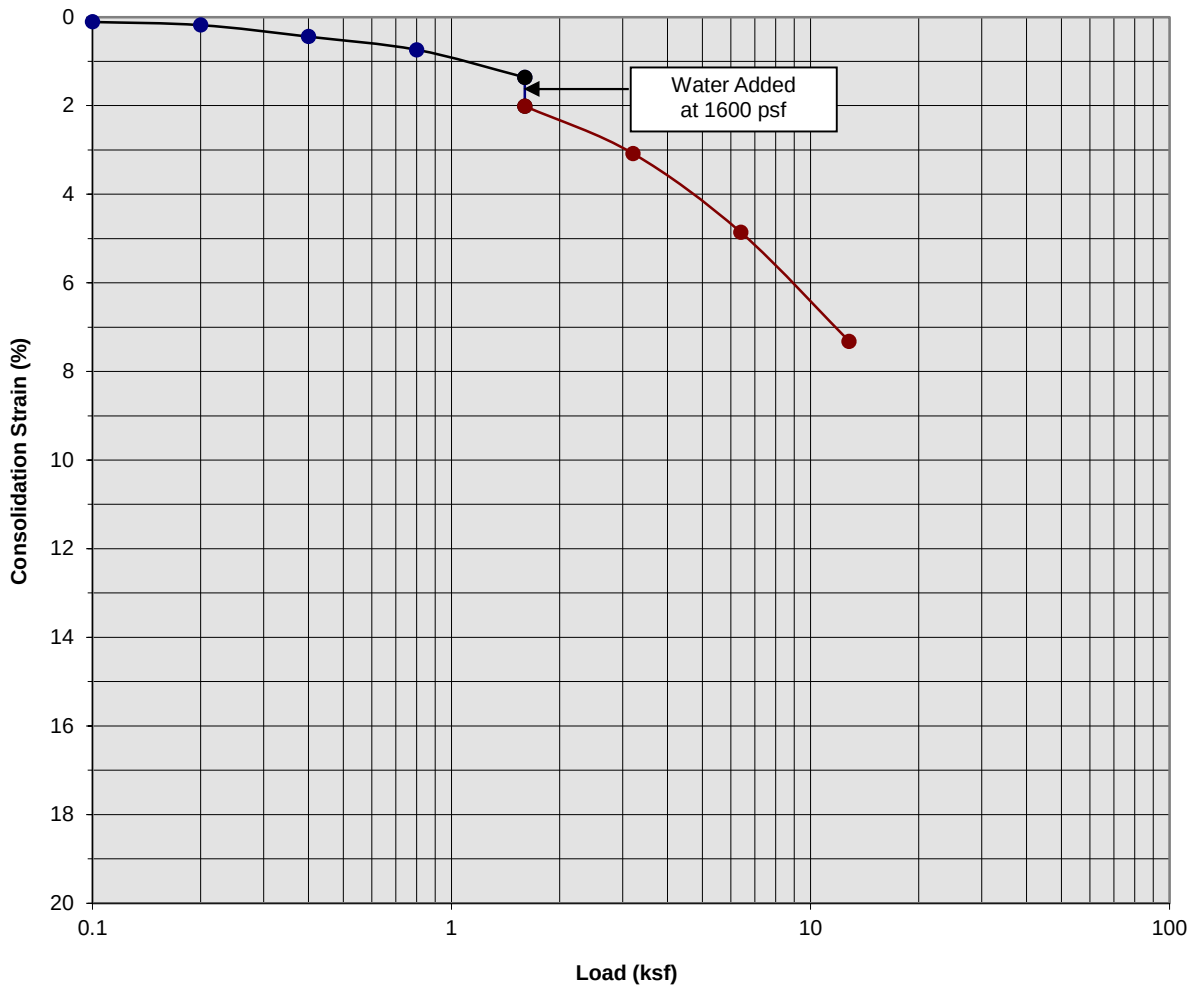
Boring Number:	B-8	Initial Moisture Content (%)	16
Sample Number:	---	Final Moisture Content (%)	27
Depth (ft)	5 to 6	Initial Dry Density (pcf)	90.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	113.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	4.68

Proposed Warehouse
Perris, CA
Project No. 21G147-3

PLATE C- 3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: Light Gray Silty Clay to Clayey Silt

Boring Number:	B-8	Initial Moisture Content (%)	20
Sample Number:	---	Final Moisture Content (%)	27
Depth (ft)	7 to 8	Initial Dry Density (pcf)	94.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	101.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.65

Proposed Warehouse
Perris, CA
Project No. 21G147-3

PLATE C- 4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

APPENDIX D

GRADING GUIDE SPECIFICATIONS

These grading guide specifications are intended to provide typical procedures for grading operations. They are intended to supplement the recommendations contained in the geotechnical investigation report for this project. Should the recommendations in the geotechnical investigation report conflict with the grading guide specifications, the more site specific recommendations in the geotechnical investigation report will govern.

General

- The Earthwork Contractor is responsible for the satisfactory completion of all earthwork in accordance with the plans and geotechnical reports, and in accordance with city, county, and applicable building codes.

- The Geotechnical Engineer is the representative of the Owner/Builder for the purpose of implementing the report recommendations and guidelines. These duties are not intended to relieve the Earthwork Contractor of any responsibility to perform in a workman-like manner, nor is the Geotechnical Engineer to direct the grading equipment or personnel employed by the Contractor.

- The Earthwork Contractor is required to notify the Geotechnical Engineer of the anticipated work and schedule so that testing and inspections can be provided. If necessary, work may be stopped and redone if personnel have not been scheduled in advance.

- The Earthwork Contractor is required to have suitable and sufficient equipment on the job-site to process, moisture condition, mix and compact the amount of fill being placed to the approved compaction. In addition, suitable support equipment should be available to conform with recommendations and guidelines in this report.

- Canyon cleanouts, overexcavation areas, processed ground to receive fill, key excavations, subdrains and benches should be observed by the Geotechnical Engineer prior to placement of any fill. It is the Earthwork Contractor's responsibility to notify the Geotechnical Engineer of areas that are ready for inspection.

- Excavation, filling, and subgrade preparation should be performed in a manner and sequence that will provide drainage at all times and proper control of erosion. Precipitation, springs, and seepage water encountered shall be pumped or drained to provide a suitable working surface. The Geotechnical Engineer must be informed of springs or water seepage encountered during grading or foundation construction for possible revision to the recommended construction procedures and/or installation of subdrains.

Site Preparation

- The Earthwork Contractor is responsible for all clearing, grubbing, stripping and site preparation for the project in accordance with the recommendations of the Geotechnical Engineer.

- If any materials or areas are encountered by the Earthwork Contractor which are suspected of having toxic or environmentally sensitive contamination, the Geotechnical Engineer and Owner/Builder should be notified immediately.

- Major vegetation should be stripped and disposed of off-site. This includes trees, brush, heavy grasses and any materials considered unsuitable by the Geotechnical Engineer.

- Underground structures such as basements, cesspools or septic disposal systems, mining shafts, tunnels, wells and pipelines should be removed under the inspection of the Geotechnical Engineer and recommendations provided by the Geotechnical Engineer and/or city, county or state agencies. If such structures are known or found, the Geotechnical Engineer should be notified as soon as possible so that recommendations can be formulated.

- Any topsoil, slopewash, colluvium, alluvium and rock materials which are considered unsuitable by the Geotechnical Engineer should be removed prior to fill placement.

- Remaining voids created during site clearing caused by removal of trees, foundations basements, irrigation facilities, etc., should be excavated and filled with compacted fill.

- Subsequent to clearing and removals, areas to receive fill should be scarified to a depth of 10 to 12 inches, moisture conditioned and compacted

- The moisture condition of the processed ground should be at or slightly above the optimum moisture content as determined by the Geotechnical Engineer. Depending upon field conditions, this may require air drying or watering together with mixing and/or discing.

Compacted Fills

- Soil materials imported to or excavated on the property may be utilized in the fill, provided each material has been determined to be suitable in the opinion of the Geotechnical Engineer. Unless otherwise approved by the Geotechnical Engineer, all fill materials shall be free of deleterious, organic, or frozen matter, shall contain no chemicals that may result in the material being classified as “contaminated,” and shall be very low to non-expansive with a maximum expansion index (EI) of 50. The top 12 inches of the compacted fill should have a maximum particle size of 3 inches, and all underlying compacted fill material a maximum 6-inch particle size, except as noted below.

- All soils should be evaluated and tested by the Geotechnical Engineer. Materials with high expansion potential, low strength, poor gradation or containing organic materials may require removal from the site or selective placement and/or mixing to the satisfaction of the Geotechnical Engineer.

- Rock fragments or rocks less than 6 inches in their largest dimensions, or as otherwise determined by the Geotechnical Engineer, may be used in compacted fill, provided the distribution and placement is satisfactory in the opinion of the Geotechnical Engineer.

- Rock fragments or rocks greater than 12 inches should be taken off-site or placed in accordance with recommendations and in areas designated as suitable by the Geotechnical Engineer. These materials should be placed in accordance with Plate D-8 of these Grading Guide Specifications and in accordance with the following recommendations:

    - Rocks 12 inches or more in diameter should be placed in rows at least 15 feet apart, 15 feet from the edge of the fill, and 10 feet or more below subgrade. Spaces should be left between each rock fragment to provide for placement and compaction of soil around the fragments.

    - Fill materials consisting of soil meeting the minimum moisture content requirements and free of oversize material should be placed between and over the rows of rock or

concrete. Ample water and compactive effort should be applied to the fill materials as they are placed in order that all of the voids between each of the fragments are filled and compacted to the specified density.

- Subsequent rows of rocks should be placed such that they are not directly above a row placed in the previous lift of fill. A minimum 5-foot offset between rows is recommended.

- To facilitate future trenching, oversized material should not be placed within the range of foundation excavations, future utilities or other underground construction unless specifically approved by the soil engineer and the developer/owner representative.

- Fill materials approved by the Geotechnical Engineer should be placed in areas previously prepared to receive fill and in evenly placed, near horizontal layers at about 6 to 8 inches in loose thickness, or as otherwise determined by the Geotechnical Engineer for the project.

- Each layer should be moisture conditioned to optimum moisture content, or slightly above, as directed by the Geotechnical Engineer. After proper mixing and/or drying, to evenly distribute the moisture, the layers should be compacted to at least 90 percent of the maximum dry density in compliance with ASTM D-1557-78 unless otherwise indicated.

- Density and moisture content testing should be performed by the Geotechnical Engineer at random intervals and locations as determined by the Geotechnical Engineer. These tests are intended as an aid to the Earthwork Contractor, so he can evaluate his workmanship, equipment effectiveness and site conditions. The Earthwork Contractor is responsible for compaction as required by the Geotechnical Report(s) and governmental agencies.

- Fill areas unused for a period of time may require moisture conditioning, processing and recompaction prior to the start of additional filling. The Earthwork Contractor should notify the Geotechnical Engineer of his intent so that an evaluation can be made.

- Fill placed on ground sloping at a 5-to-1 inclination (horizontal-to-vertical) or steeper should be benched into bedrock or other suitable materials, as directed by the Geotechnical Engineer. Typical details of benching are illustrated on Plates D-2, D-4, and D-5.

- Cut/fill transition lots should have the cut portion overexcavated to a depth of at least 3 feet and rebuilt with fill (see Plate D-1), as determined by the Geotechnical Engineer.

- All cut lots should be inspected by the Geotechnical Engineer for fracturing and other bedrock conditions. If necessary, the pads should be overexcavated to a depth of 3 feet and rebuilt with a uniform, more cohesive soil type to impede moisture penetration.

- Cut portions of pad areas above buttresses or stabilizations should be overexcavated to a depth of 3 feet and rebuilt with uniform, more cohesive compacted fill to impede moisture penetration.

- Non-structural fill adjacent to structural fill should typically be placed in unison to provide lateral support. Backfill along walls must be placed and compacted with care to ensure that excessive unbalanced lateral pressures do not develop. The type of fill material placed adjacent to below grade walls must be properly tested and approved by the Geotechnical Engineer with consideration of the lateral earth pressure used in the design.

Foundations

- The foundation influence zone is defined as extending one foot horizontally from the outside edge of a footing, and proceeding downward at a ½ horizontal to 1 vertical (0.5:1) inclination.

- Where overexcavation beneath a footing subgrade is necessary, it should be conducted so as to encompass the entire foundation influence zone, as described above.

- Compacted fill adjacent to exterior footings should extend at least 12 inches above foundation bearing grade. Compacted fill within the interior of structures should extend to the floor subgrade elevation.

Fill Slopes

- The placement and compaction of fill described above applies to all fill slopes. Slope compaction should be accomplished by overfilling the slope, adequately compacting the fill in even layers, including the overfilled zone and cutting the slope back to expose the compacted core

- Slope compaction may also be achieved by backrolling the slope adequately every 2 to 4 vertical feet during the filling process as well as requiring the earth moving and compaction equipment to work close to the top of the slope. Upon completion of slope construction, the slope face should be compacted with a sheepsfoot connected to a sideboom and then grid rolled. This method of slope compaction should only be used if approved by the Geotechnical Engineer.

- Sandy soils lacking in adequate cohesion may be unstable for a finished slope condition and therefore should not be placed within 15 horizontal feet of the slope face.

- All fill slopes should be keyed into bedrock or other suitable material. Fill keys should be at least 15 feet wide and inclined at 2 percent into the slope. For slopes higher than 30 feet, the fill key width should be equal to one-half the height of the slope (see Plate D-5).

- All fill keys should be cleared of loose slough material prior to geotechnical inspection and should be approved by the Geotechnical Engineer and governmental agencies prior to filling.

- The cut portion of fill over cut slopes should be made first and inspected by the Geotechnical Engineer for possible stabilization requirements. The fill portion should be adequately keyed through all surficial soils and into bedrock or suitable material. Soils should be removed from the transition zone between the cut and fill portions (see Plate D-2).

Cut Slopes

- All cut slopes should be inspected by the Geotechnical Engineer to determine the need for stabilization. The Earthwork Contractor should notify the Geotechnical Engineer when slope cutting is in progress at intervals of 10 vertical feet. Failure to notify may result in a delay in recommendations.

- Cut slopes exposing loose, cohesionless sands should be reported to the Geotechnical Engineer for possible stabilization recommendations.

- All stabilization excavations should be cleared of loose slough material prior to geotechnical inspection. Stakes should be provided by the Civil Engineer to verify the location and dimensions of the key. A typical stabilization fill detail is shown on Plate D-5.

- Stabilization key excavations should be provided with subdrains. Typical subdrain details are shown on Plates D-6.

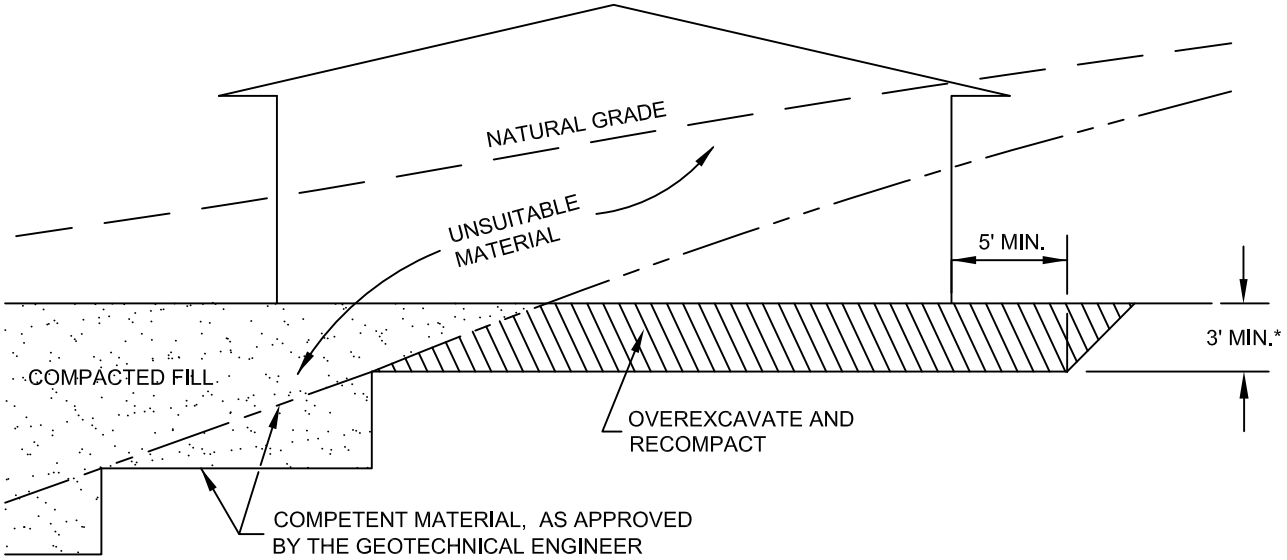
Subdrains

- Subdrains may be required in canyons and swales where fill placement is proposed. Typical subdrain details for canyons are shown on Plate D-3. Subdrains should be installed after approval of removals and before filling, as determined by the Soils Engineer.

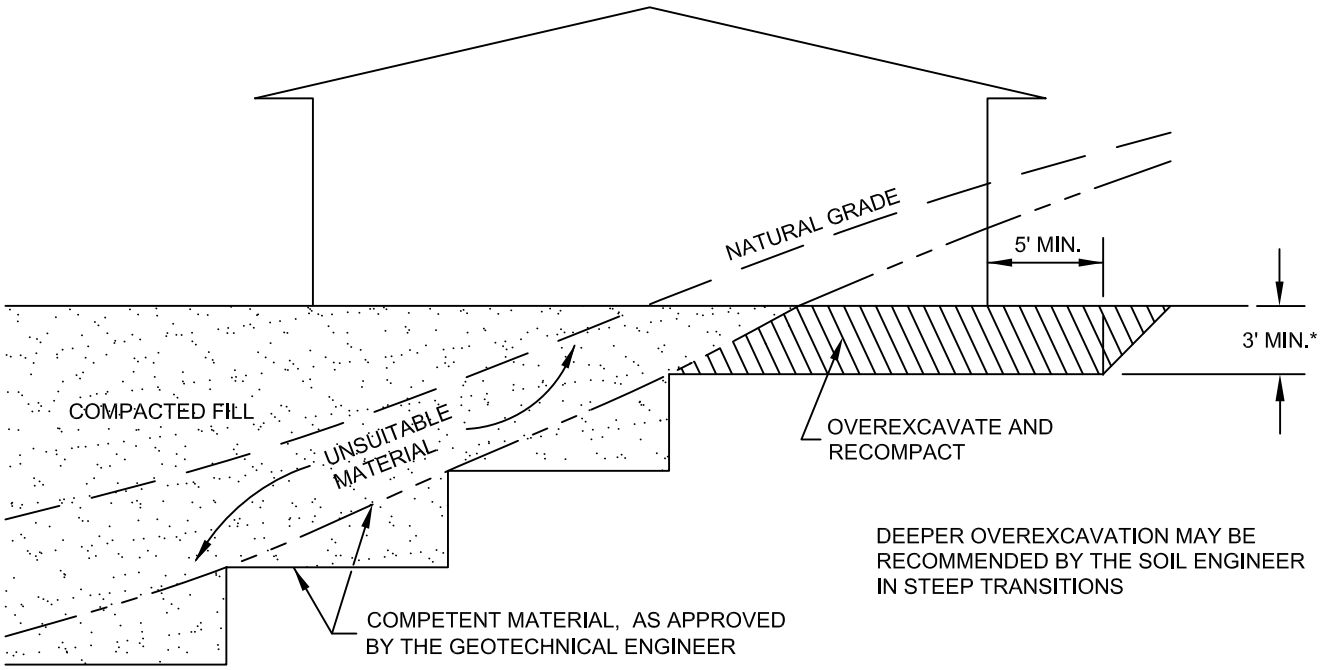
- Plastic pipe may be used for subdrains provided it is Schedule 40 or SDR 35 or equivalent. Pipe should be protected against breakage, typically by placement in a square-cut (backhoe) trench or as recommended by the manufacturer.

- Filter material for subdrains should conform to CALTRANS Specification 68-1.025 or as approved by the Geotechnical Engineer for the specific site conditions. Clean ¾-inch crushed rock may be used provided it is wrapped in an acceptable filter cloth and approved by the Geotechnical Engineer. Pipe diameters should be 6 inches for runs up to 500 feet and 8 inches for the downstream continuations of longer runs. Four-inch diameter pipe may be used in buttress and stabilization fills.

CUT LOT



CUT/FILL LOT (TRANSITION)



*SEE TEXT OF REPORT FOR SPECIFIC RECOMMENDATION. ACTUAL DEPTH OF OVEREXCAVATION MAY BE GREATER.

TRANSITION LOT DETAIL

GRADING GUIDE SPECIFICATIONS

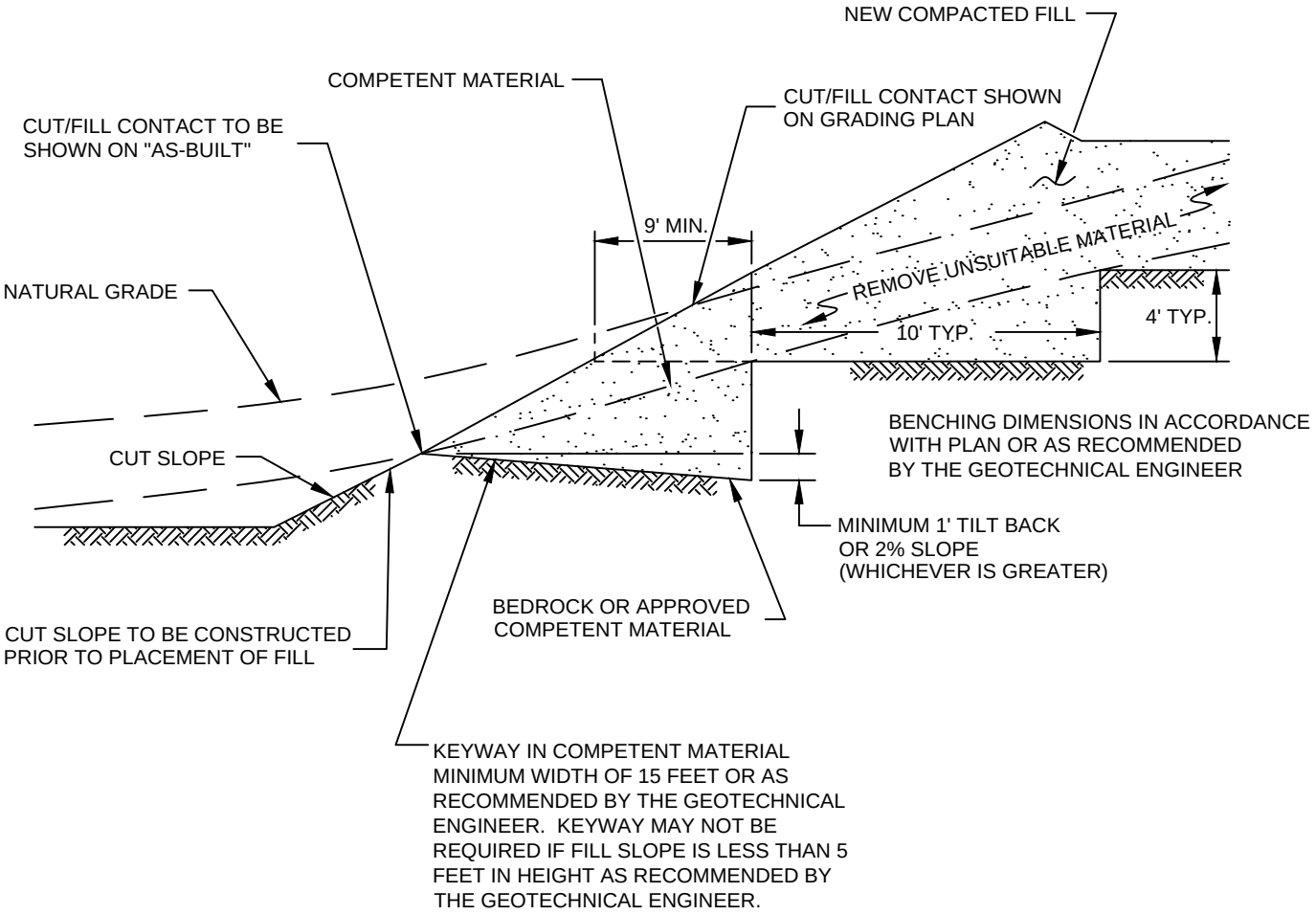
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-1

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



FILL ABOVE CUT SLOPE DETAIL

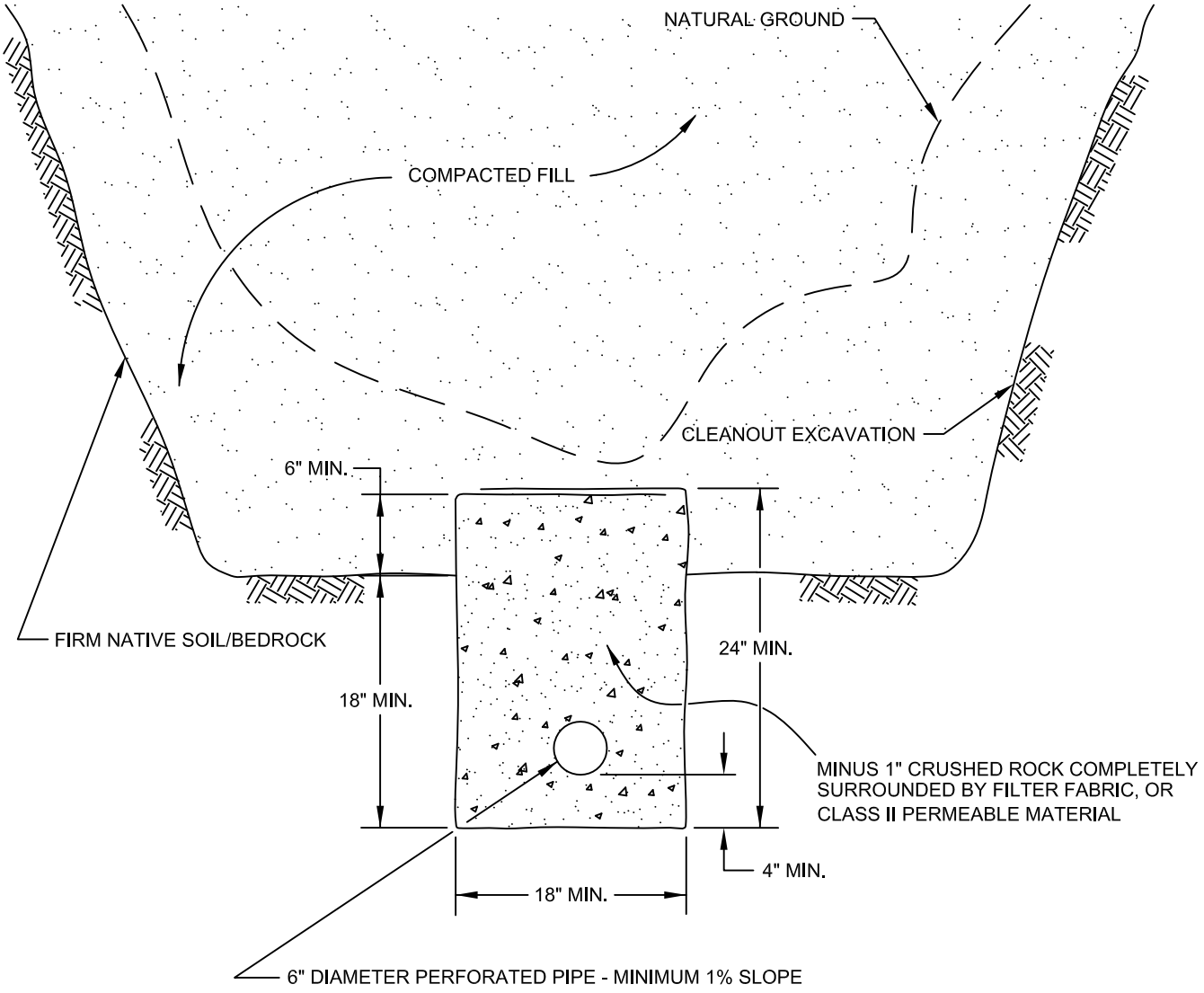
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



PIPE MATERIAL	DEPTH OF FILL OVER SUBDRAIN
ADS (CORRUGATED POLETHYLENE)	8
TRANSITE UNDERDRAIN	20
PVC OR ABS: SDR 35	35
SDR 21	100

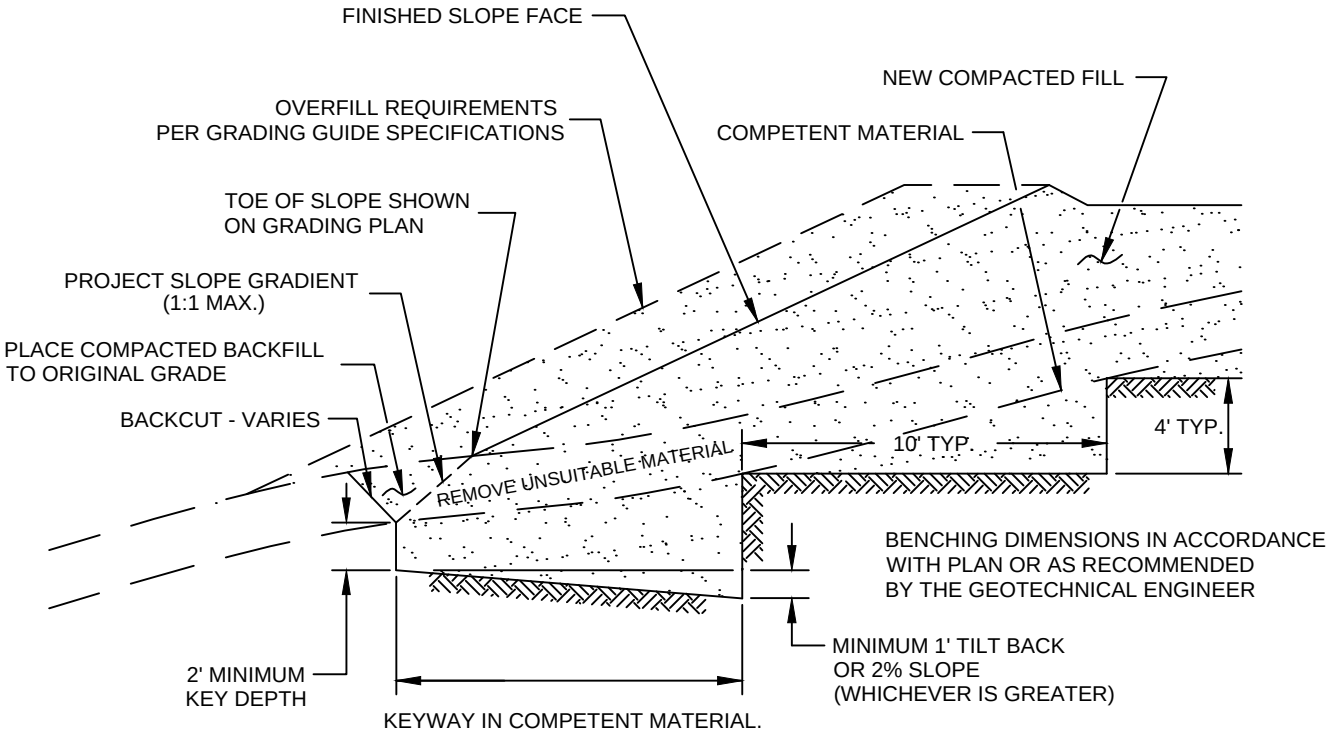
SCHEMATIC ONLY
NOT TO SCALE

CANYON SUBDRAIN DETAIL
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE
DRAWN: JAS
CHKD: GKM

PLATE D-3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



NOTE:
BENCHING SHALL BE REQUIRED WHEN NATURAL SLOPES ARE EQUAL TO OR STEEPER THAN 5:1 OR WHEN RECOMMENDED BY THE GEOTECHNICAL ENGINEER.

FILL ABOVE NATURAL SLOPE DETAIL

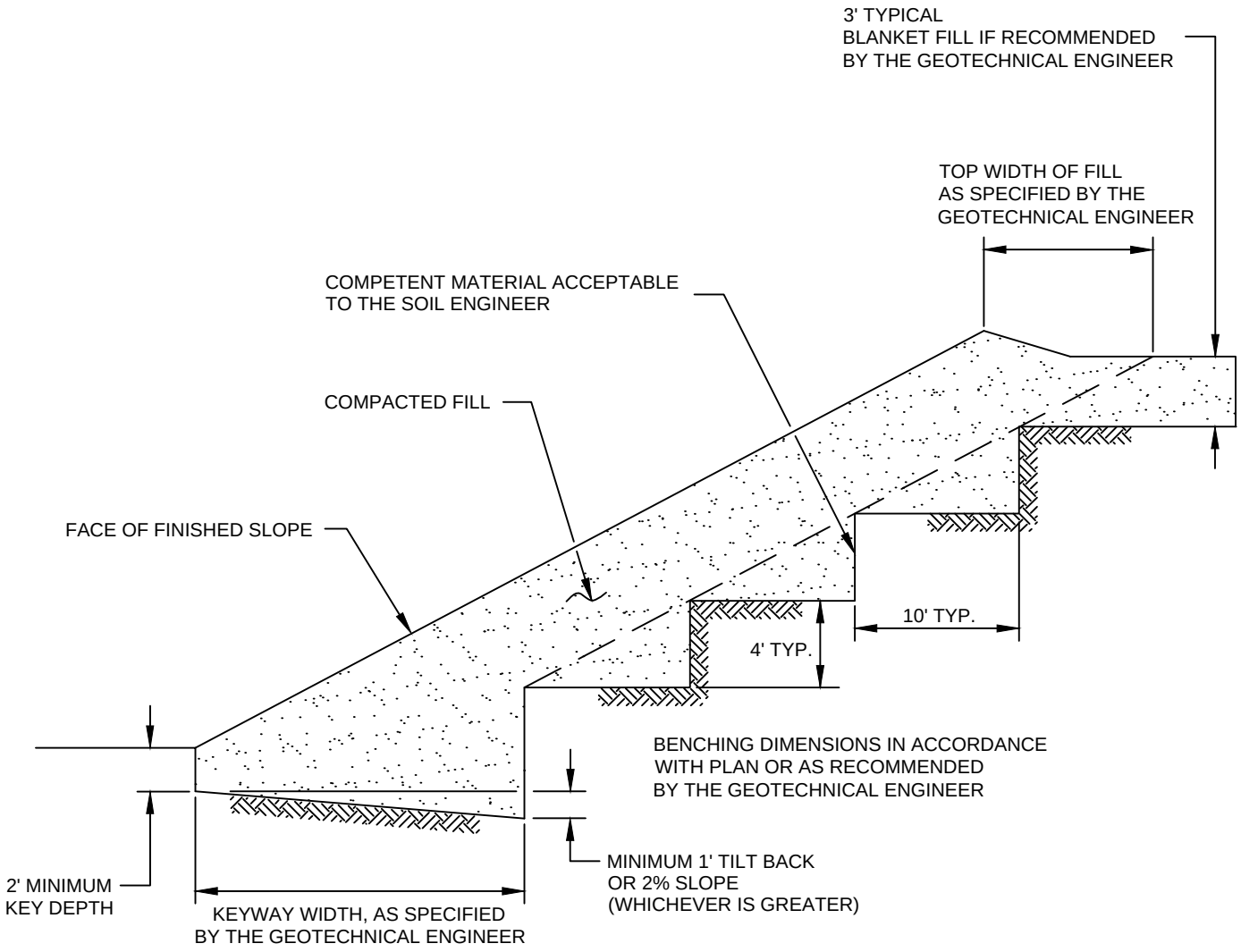
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



STABILIZATION FILL DETAIL

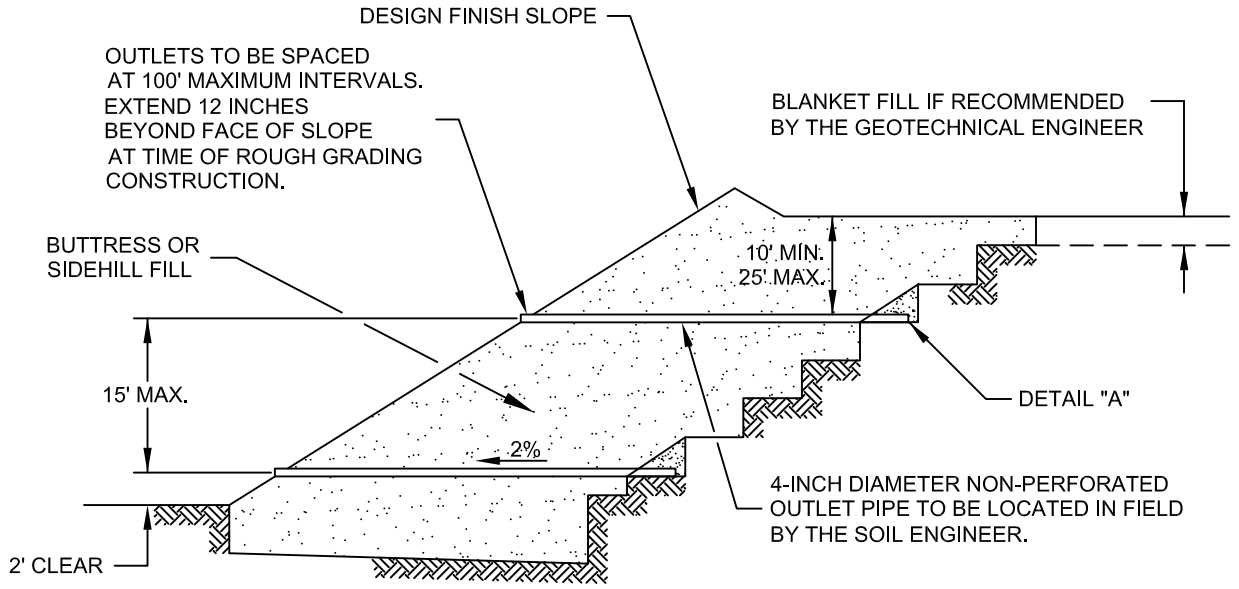
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-5

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



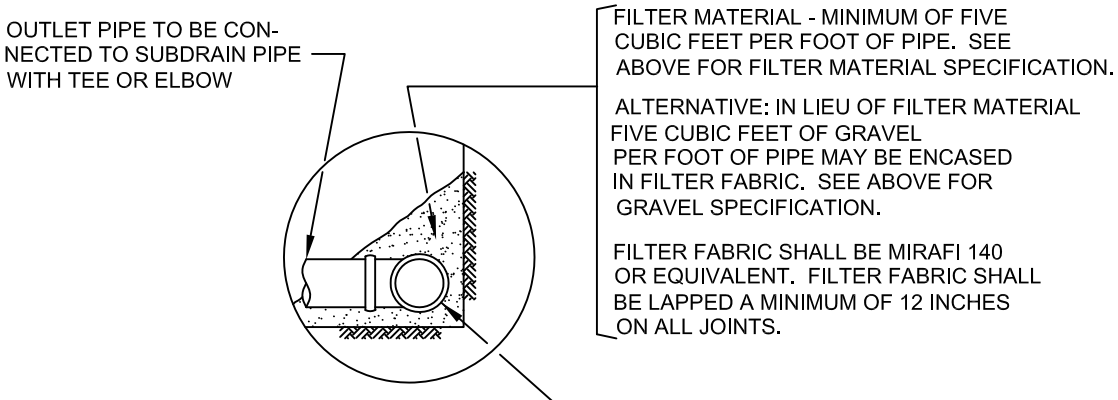
"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1 1/2"	100
NO. 4	50
NO. 200	8

SAND EQUIVALENT = MINIMUM OF 50



DETAIL "A"

NOTES:
1. TRENCH FOR OUTLET PIPES TO BE BACKFILLED WITH ON-SITE SOIL.

SLOPE FILL SUBDRAINS

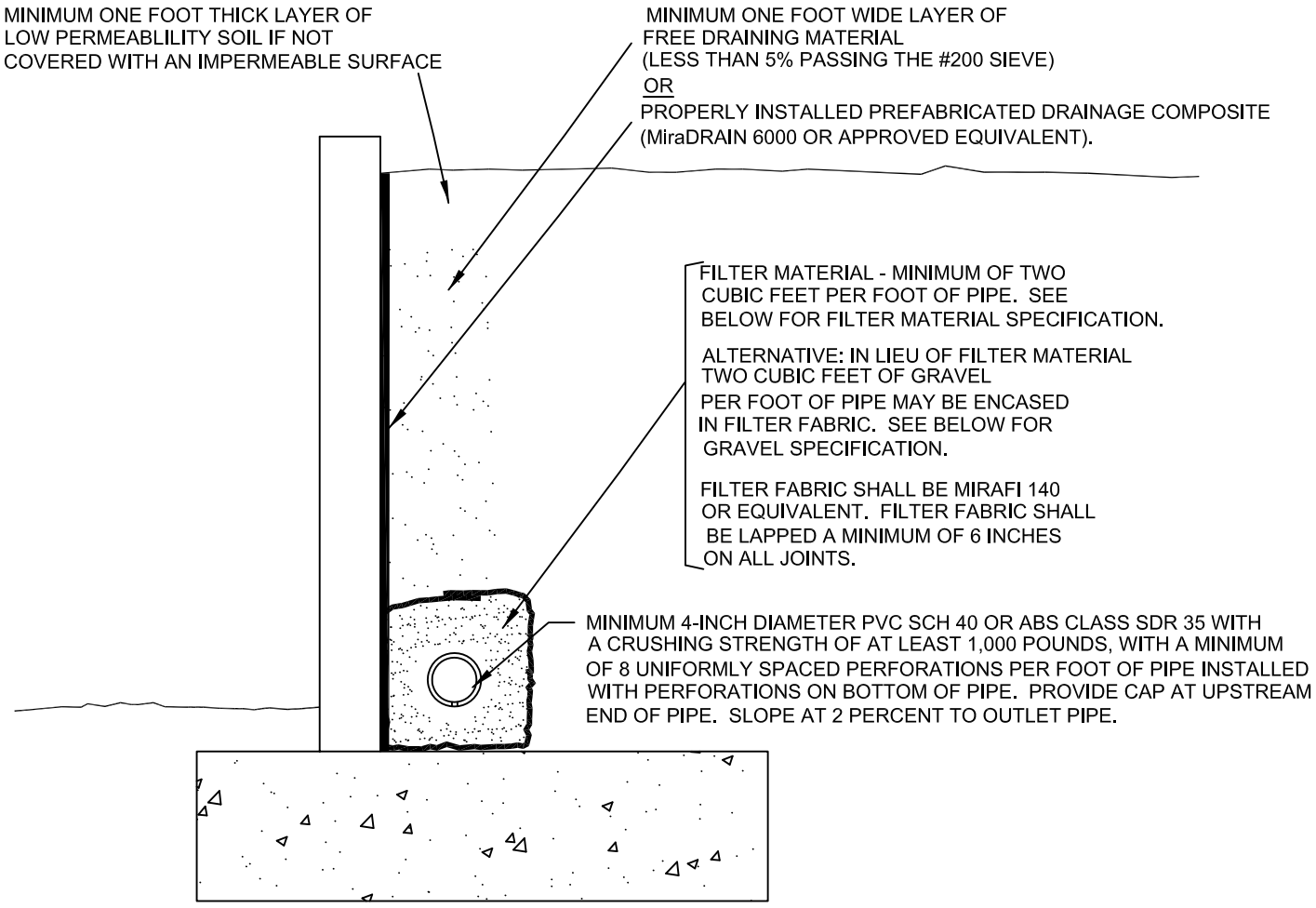
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-6

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1 1/2"	100
NO. 4	50
NO. 200	8

SAND EQUIVALENT = MINIMUM OF 50

RETAINING WALL BACKDRAINS

GRADING GUIDE SPECIFICATIONS

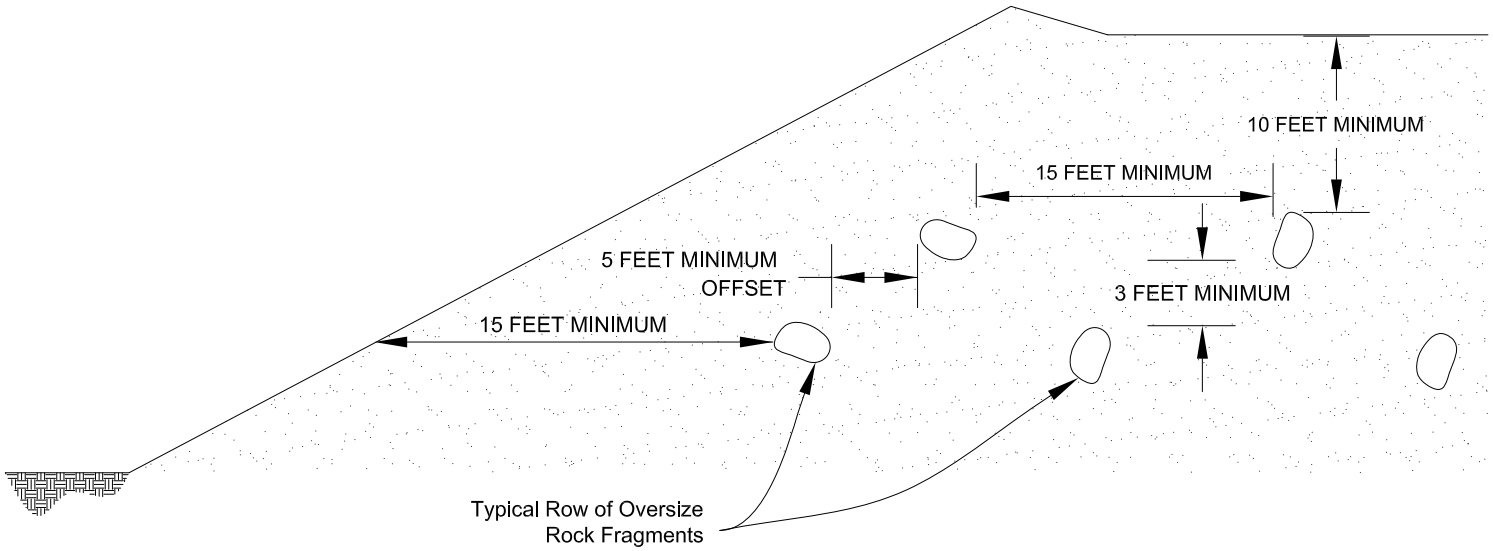
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DRAWN: JAS
CHKD: GKM

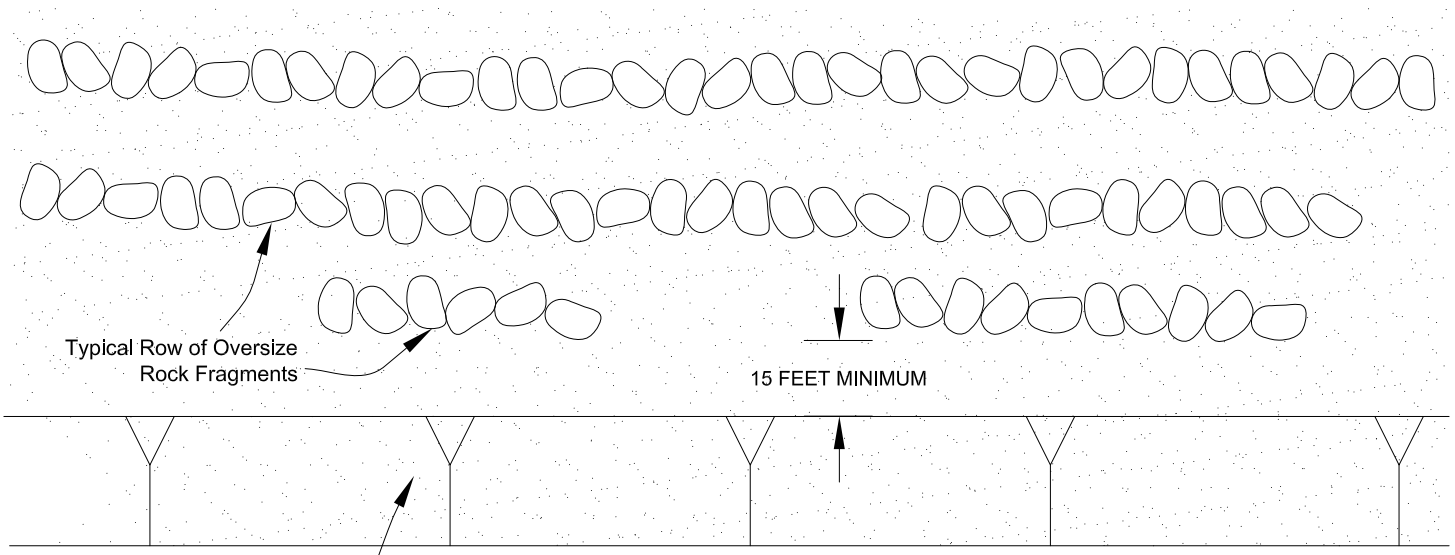
PLATE D-7

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



Section View



Plan View

PLACEMENT OF OVERSIZED MATERIAL

GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: PM
CHKD: GKM

PLATE D-8

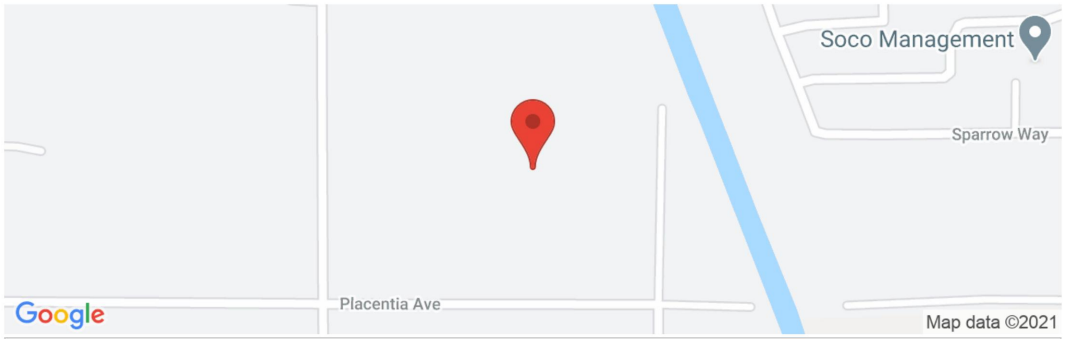
SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX E

OSHPD

Latitude, Longitude: 33.824379, -117.210255



Date	4/9/2021, 2:16:54 PM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.5	MCE_R ground motion. (for 0.2 second period)
S_1	0.572	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.5	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.55	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.525	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.636	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.572	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.627	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.932	Mapped value of the risk coefficient at short periods
C_{R1}	0.911	Mapped value of the risk coefficient at a period of 1 s

SOURCE: SEAOC/OSHPD Seismic Design Maps Tool
<https://seismicmaps.org/>

SEISMIC DESIGN PARAMETERS - 2019 CBC
PROPOSED WAREHOUSE
PERRIS, CALIFORNIA

DRAWN: MD
CHKD: RGT
SCG PROJECT 21G147-3
PLATE E-1

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX F

LIQUEFACTION EVALUATION

Project Name	Proposed Warehouse	MCE_G Design Acceleration	0.550	(g)
Project Location	Perris	Design Magnitude	6.97	
Project Number	21G147-1	Historic High Depth to Groundwater	25	(ft)
Engineer	RF	Depth to Groundwater at Time of Drilling	29	(ft)
		Borehole Diameter	6	(in)
Boring No.	B-1			

Sample Depth (ft)	Depth to Top of Layer (ft)	Depth to Bottom of Layer (ft)	Depth to Midpoint (ft)	Uncorrected SPT N-Value	Unit Weight of Soil (pcf)	Fines Content (%)	Energy Correction	C_B	C_S	C_N	Rod Length Correction	$(N_1)_{60}$	$(N_1)_{60CS}$	Overburden Stress (σ_o) (psf)	Eff. Overburden Stress (Hist. Water) (σ_o') (psf)	Eff. Overburden Stress (Curr. Water) (σ_o') (psf)	Stress Reduction Coefficient (r_d)	MSF	Ks	Cyclic Resistance Ratio (M=7.5)	Cyclic Resistance Ratio (M=6.97)	Cyclic Stress Ratio Induced by Design Earthquake	Factor of Safety	Comments
							(1)	(2)	(3)	(4)	(5)	(6)	(7)				(8)	(9)	(10)	(11)	(12)	(13)		
12.5	0	25	12.5		120		1.3	1.05	1.1	1.31	0.75	0.0	0.0	1500	1500	1500	0.96	1.02	1.02	0.06	0.06	N/A	N/A	Above Water Table
29.5	25	32	28.5	23	120	66	1.3	1.05	1.3	0.86	0.95	33.5	39.1	3420	3202	3420	0.88	1.23	0.88	2.00	2.00	0.34	5.92	Non-Liquefiable
34.5	32	37	34.5	34	120		1.3	1.05	1.3	0.88	1	52.9	52.9	4140	3547	3797	0.85	1.23	0.85	2.00	2.00	0.36	5.63	Non-Liquefiable
39.5	37	42	39.5	30	120		1.3	1.05	1.3	0.84	1	44.5	44.5	4740	3835	4085	0.82	1.23	0.82	2.00	2.00	0.36	5.50	Non-Liquefiable
44.5	42	47	44.5	24	120	34	1.3	1.05	1.3	0.80	1	34.3	39.7	5340	4123	4373	0.80	1.23	0.8	2.00	1.96	0.37	5.33	Non-Liquefiable
49.5	47	50	48.5	32	120		1.3	1.05	1.3	0.82	1	46.4	46.4	5820	4354	4603	0.77	1.23	0.78	2.00	1.92	0.37	5.21	Non-Liquefiable

Notes:

(1) Energy Correction for N_{90} of automatic hammer to standard N_{60}

(2) Borehole Diameter Correction (Skempton, 1986)

(3) Correction for split-spoon sampler with room for liners, but liners are absent, (Seed et al., 1984, 2001)

(4) Overburden Correction, Caluclated by Eq. 39 (Boulanger and Idriss, 2008)

(5) Rod Length Correction for Samples <10 m in depth

(6) N-value corrected for energy, borehole diameter, sampler with absent liners, rod length, and overburden

(7) N-value corrected for fines content per Eqs. 75 and 76 (Boulanger and Idriss, 2008)

(8) Stress Reduction Coefficient calculated by Eq. 22 (Boulanger and Idriss, 2008)

(9) Magnitude Scaling Factor calculated by Eqns. A.8 & A.10 (Boulanger and Idriss, 2014)

(10) Overburden Correction Factor calcuated by Eq. 54 (Boulanger and Idriss, 2008)

(11) Calcuated by Eq. 70 (Boulanger and Idriss, 2008)

(12) Calcuated by Eq. 72 (Boulanger and Idriss, 2008)

(13) Calcuated by Eq. 25 (Boulanger and Idriss, 2008)

LIQUEFACTION INDUCED SETTLEMENTS

Project Name	Proposed Warehouse
Project Location	Perris
Project Number	21G147-1
Engineer	RF

Boring No. B-1

Sample Depth (ft)	Depth to Top of Layer (ft)	Depth to Bottom of Layer (ft)	Depth to Midpoint (ft)	$(N_1)_{60}$	DN for fines content	$(N_1)_{60\text{-}CS}$	Liquefaction Factor of Safety	Limiting Shear Strain γ_{min}	Parameter Fα	Maximum Shear Strain γ_{max}	Height of Layer		Vertical Reconsolidation Strain ε_v		Total Deformation of Layer (in)	Comments
				(1)	(2)	(3)	(4)	(5)	(6)	(7)			(8)			
12.5	0	25	12.5	0.0	0.0	0.0	N/A	0.50	0.95	0.00	25.00		0.000		0.00	Above Water Table
29.5	25	32	28.5	33.5	5.6	39.1	5.92	0.01	-0.74	0.00	7.00		0.000		0.00	Non-Liquefiable
34.5	32	37	34.5	52.9	0.0	52.9	5.63	0.00	-1.82	0.00	5.00		0.000		0.00	Non-Liquefiable
39.5	37	42	39.5	44.5	0.0	44.5	5.50	0.00	-1.15	0.00	5.00		0.000		0.00	Non-Liquefiable
44.5	42	47	44.5	34.3	5.5	39.7	5.33	0.01	-0.78	0.00	5.00		0.000		0.00	Non-Liquefiable
49.5	47	50	48.5	46.4	0.0	46.4	5.21	0.00	-1.30	0.00	3.00		0.000		0.00	Non-Liquefiable
											Total Deformation (in)				0.00	

Notes:

(1) $(N_1)_{60}$ calculated previously for the individual layer

(2) Correction for fines content per Equation 76 (Boulanger and Idriss, 2008)

(3) Corrected $(N_1)_{60}$ for fines content

(4) Factor of Safety against Liquefaction, calculated previously for the individual layer

(5) Calcuated by Eq. 86 (Boulanger and Idriss, 2008)

(6) Calcuated by Eq. 89 (Boulanger and Idriss, 2008)

(7) Calcuated by Eqs. 90, 91, and 92 (Boulanger and Idriss, 2008)

(8) Volumetric Strain Induced in a Liquefiable Layer, Calcuated by Eq. 96 (Boulanger and Idriss, 2008)
(Strain N/A if Factor of Safety against Liquefaction > 1.3)

LIQUEFACTION EVALUATION

Project Name	Proposed Warehouse	MCE_G Design Acceleration	0.550 (g)
Project Location	Perris	Design Magnitude	6.97
Project Number	21G147-1	Historic High Depth to Groundwater	25 (ft)
Engineer	RF	Depth to Groundwater at Time of Drilling	29 (ft)
		Borehole Diameter	6 (in)
Boring No.	B-5		

Sample Depth (ft)	Depth to Top of Layer (ft)	Depth to Bottom of Layer (ft)	Depth to Midpoint (ft)	Uncorrected SPT N-Value	Unit Weight of Soil (pcf)	Fines Content (%)	Energy Correction	C_B	C_S	C_N	Rod Length Correction	$(N_1)_{60}$	$(N_1)_{60CS}$	Overburden Stress (σ_o) (psf)	Eff. Overburden Stress (Hist. Water) (σ_o') (psf)	Eff. Overburden Stress (Curr. Water) (σ_o') (psf)	Stress Reduction Coefficient (r_d)	MSF	Ks	Cyclic Resistance Ratio (M=7.5)	Cyclic Resistance Ratio (M=6.97)	Cyclic Stress Ratio Induced by Design Earthquake	Factor of Safety	Comments
							(1)	(2)	(3)	(4)	(5)	(6)	(7)				(8)	(9)	(10)	(11)	(12)	(13)		
12.5	0	25	12.5		120		1.3	1.05	1.1	1.31	0.75	0.0	0.0	1500	1500	1500	0.96	1.02	1.02	0.06	0.06	N/A	N/A	Above Water Table
29.5	25	32	28.5	33	120		1.3	1.05	1.3	0.89	0.95	49.5	49.5	3420	3202	3420	0.88	1.23	0.88	2.00	2.00	0.34	5.92	Non-Liquefiable
34.5	32	37	34.5	16	120	26	1.3	1.05	1.21	0.80	1	21.0	26.2	4140	3547	3797	0.85	1.15	0.91	0.32	0.33	0.36	0.94	**Liquefiable**
39.5	37	42	39.5	28	120	44	1.3	1.05	1.3	0.85	1	42.0	47.6	4740	3835	4085	0.82	1.23	0.82	2.00	2.00	0.36	5.50	Non-Liquefiable
44.5	42	47	44.5	39	120		1.3	1.05	1.3	0.87	1	60.4	60.4	5340	4123	4373	0.80	1.23	0.8	2.00	1.96	0.37	5.33	Non-Liquefiable
49.5	47	50	48.5	97	120		1.3	1.05	1.3	1.35	1	232.6	232.6	5820	4354	4603	0.77	1.23	0.78	2.00	1.92	0.37	5.21	Non-Liquefiable

Notes:

(1) Energy Correction for N_{90} of automatic hammer to standard N_{60}

(2) Borehole Diameter Correction (Skempton, 1986)

(3) Correction for split-spoon sampler with room for liners, but liners are absent, (Seed et al., 1984, 2001)

(4) Overburden Correction, Caluclated by Eq. 39 (Boulanger and Idriss, 2008)

(5) Rod Length Correction for Samples <10 m in depth

(6) N-value corrected for energy, borehole diameter, sampler with absent liners, rod length, and overburden

(7) N-value corrected for fines content per Eqs. 75 and 76 (Boulanger and Idriss, 2008)

(8) Stress Reduction Coefficient calculated by Eq. 22 (Boulanger and Idriss, 2008)

(9) Magnitude Scaling Factor calculated by Eqns. A.8 & A.10 (Boulanger and Idriss, 2014)

(10) Overburden Correction Factor calcuated by Eq. 54 (Boulanger and Idriss, 2008)

(11) Calcuated by Eq. 70 (Boulanger and Idriss, 2008)

(12) Calcuated by Eq. 72 (Boulanger and Idriss, 2008)

(13) Calcuated by Eq. 25 (Boulanger and Idriss, 2008)

LIQUEFACTION INDUCED SETTLEMENTS

Project Name	Proposed Warehouse
Project Location	Perris
Project Number	21G147-1
Engineer	RF

Boring No. B-5

Sample Depth (ft)	Depth to Top of Layer (ft)	Depth to Bottom of Layer (ft)	Depth to Midpoint (ft)	$(N_1)_{60}$	DN for fines content	$(N_1)_{60\text{-}CS}$	Liquefaction Factor of Safety	Limiting Shear Strain γ_{min}	Parameter Fα	Maximum Shear Strain γ_{max}	Height of Layer		Vertical Reconsolidation Strain ε_v		Total Deformation of Layer (in)	Comments
				(1)	(2)	(3)	(4)	(5)	(6)	(7)			(8)			
12.5	0	25	12.5	0.0	0.0	0.0	N/A	0.50	0.95	0.00	25.00		0.000		0.00	Above Water Table
29.5	25	32	28.5	49.5	0.0	49.5	5.92	0.00	-1.55	0.00	7.00		0.000		0.00	Non-Liquefiable
34.5	32	37	34.5	21.0	5.1	26.2	0.94	0.08	0.16	0.04	5.00		0.009		0.54	**Liquefiable**
39.5	37	42	39.5	42.0	5.6	47.6	5.50	0.00	-1.40	0.00	5.00		0.000		0.00	Non-Liquefiable
44.5	42	47	44.5	60.4	0.0	60.4	5.33	0.00	-2.46	0.00	5.00		0.000		0.00	Non-Liquefiable
49.5	47	50	48.5	232.6	0.0	232.6	5.21	0.00	-19.68	0.00	3.00		0.000		0.00	Non-Liquefiable
											Total Deformation (in)				0.54	

Notes:

(1) $(N_1)_{60}$ calculated previously for the individual layer

(2) Correction for fines content per Equation 76 (Boulanger and Idriss, 2008)

(3) Corrected $(N_1)_{60}$ for fines content

(4) Factor of Safety against Liquefaction, calculated previously for the individual layer

(5) Calcuated by Eq. 86 (Boulanger and Idriss, 2008)

(6) Calcuated by Eq. 89 (Boulanger and Idriss, 2008)

(7) Calcuated by Eqs. 90, 91, and 92 (Boulanger and Idriss, 2008)

(8) Volumetric Strain Induced in a Liquefiable Layer, Calcuated by Eq. 96 (Boulanger and Idriss, 2008)
(Strain N/A if Factor of Safety against Liquefaction > 1.3)

LIQUEFACTION EVALUATION

Project Name	Proposed Warehouse	MCE_G Design Acceleration	0.550 (g)
Project Location	Perris	Design Magnitude	6.97
Project Number	21G147-3	Historic High Depth to Groundwater	25 (ft)
Engineer	PM	Depth to Groundwater at Time of Drilling	30 (ft)
		Borehole Diameter	6 (in)
Boring No.	B-9		

Sample Depth (ft)	Depth to Top of Layer (ft)	Depth to Bottom of Layer (ft)	Depth to Midpoint (ft)	Uncorrected SPT N-Value	Unit Weight of Soil (pcf)	Fines Content (%)	Energy Correction	C_B	C_S	C_N	Rod Length Correction	$(N_1)_{60}$	$(N_1)_{60CS}$	Overburden Stress (σ_o) (psf)	Eff. Overburden Stress (Hist. Water) (σ_o') (psf)	Eff. Overburden Stress (Curr. Water) (σ_o') (psf)	Stress Reduction Coefficient (r_d)	MSF	Ks	Cyclic Resistance Ratio (M=7.5)	Cyclic Resistance Ratio (M=6.97)	Cyclic Stress Ratio Induced by Design Earthquake	Factor of Safety	Comments
							(1)	(2)	(3)	(4)	(5)	(6)	(7)				(8)	(9)	(10)	(11)	(12)	(13)		
12.5	0	25	12.5		120		1.3	1.05	1.1	1.31	0.75	0.0	0.0	1500	1500	1500	0.96	1.02	1.02	0.06	0.06	N/A	N/A	Above Water Table
24.5	25	27	26	47	120	35	1.3	1.05	1.3	0.97	0.95	76.6	82.1	3120	3058	3120	0.90	1.23	0.89	2.00	2.00	0.33	6.11	Non-Liquefiable
29.5	27	32	29.5	16	120	47	1.3	1.05	1.204	0.82	0.95	20.4	26.0	3540	3259	3540	0.88	1.15	0.93	0.32	0.34	0.34	0.98	**Liquefiable**
34.5	32	37	34.5	17	120	44	1.3	1.05	1.227	0.80	1	22.7	28.3	4140	3547	3859	0.85	1.17	0.9	0.40	0.42	0.36	1.18	**Liquefiable**
39.5	37	42	39.5	31	120	20	1.3	1.05	1.3	0.86	1	47.0	51.5	4740	3835	4147	0.82	1.23	0.82	2.00	2.00	0.36	5.50	Non-Liquefiable
44.5	42	47	44.5	51	120	17	1.3	1.05	1.3	0.96	1	87.1	91.0	5340	4123	4435	0.80	1.23	0.8	2.00	1.96	0.37	5.33	Non-Liquefiable
49.5	47	50	48.5	34	120	40	1.3	1.05	1.3	0.85	1	51.3	56.9	5820	4354	4666	0.77	1.23	0.78	2.00	1.92	0.37	5.21	Non-Liquefiable

Notes:

(1) Energy Correction for N_{90} of automatic hammer to standard N_{60}

(2) Borehole Diameter Correction (Skempton, 1986)

(3) Correction for split-spoon sampler with room for liners, but liners are absent, (Seed et al., 1984, 2001)

(4) Overburden Correction, Caluclated by Eq. 39 (Boulanger and Idriss, 2008)

(5) Rod Length Correction for Samples <10 m in depth

(6) N-value corrected for energy, borehole diameter, sampler with absent liners, rod length, and overburden

(7) N-value corrected for fines content per Eqs. 75 and 76 (Boulanger and Idriss, 2008)

(8) Stress Reduction Coefficient calculated by Eq. 22 (Boulanger and Idriss, 2008)

(9) Magnitude Scaling Factor calculated by Eqns. A.8 & A.10 (Boulanger and Idriss, 2014)

(10) Overburden Correction Factor calcuated by Eq. 54 (Boulanger and Idriss, 2008)

(11) Calcuated by Eq. 70 (Boulanger and Idriss, 2008)

(12) Calcuated by Eq. 72 (Boulanger and Idriss, 2008)

(13) Calcuated by Eq. 25 (Boulanger and Idriss, 2008)

LIQUEFACTION INDUCED SETTLEMENTS

Project Name	Proposed Warehouse
Project Location	Perris
Project Number	21G147-3
Engineer	PM

Boring No. B-9

Sample Depth (ft)	Depth to Top of Layer (ft)	Depth to Bottom of Layer (ft)	Depth to Midpoint (ft)	$(N_1)_{60}$	DN for fines content	$(N_1)_{60\text{-}CS}$	Liquefaction Factor of Safety	Limiting Shear Strain γ_{min}	Parameter Fα	Maximum Shear Strain γ_{max}	Height of Layer		Vertical Reconsolidation Strain ε_v		Total Deformation of Layer (in)	Comments
				(1)	(2)	(3)	(4)	(5)	(6)	(7)			(8)			
12.5	0	25	12.5	0.0	0.0	0.0	N/A	0.50	0.95	0.00	25.00		0.000		0.00	Above Water Table
24.5	25	27	26	76.6	5.5	82.1	6.11	0.00	-4.39	0.00	2.00		0.000		0.00	Non-Liquefiable
29.5	27	32	29.5	20.4	5.6	26.0	0.98	0.08	0.17	0.04	5.00		0.008		0.50	**Liquefiable**
34.5	32	37	34.5	22.7	5.6	28.3	1.18	0.06	0.02	0.02	5.00		0.005		0.31	**Liquefiable**
39.5	37	42	39.5	47.0	4.5	51.5	5.50	0.00	-1.71	0.00	5.00		0.000		0.00	Non-Liquefiable
44.5	42	47	44.5	87.1	3.9	91.0	5.33	0.00	-5.21	0.00	5.00		0.000		0.00	Non-Liquefiable
49.5	47	50	48.5	51.3	5.6	56.9	5.21	0.00	-2.16	0.00	3.00		0.000		0.00	Non-Liquefiable
Total Deformation (in)															0.80	

Notes:

(1) $(N_1)_{60}$ calculated previously for the individual layer

(2) Correction for fines content per Equation 76 (Boulanger and Idriss, 2008)

(3) Corrected $(N_1)_{60}$ for fines content

(4) Factor of Safety against Liquefaction, calculated previously for the individual layer

(5) Calcuated by Eq. 86 (Boulanger and Idriss, 2008)

(6) Calcuated by Eq. 89 (Boulanger and Idriss, 2008)

(7) Calcuated by Eqs. 90, 91, and 92 (Boulanger and Idriss, 2008)

(8) Volumetric Strain Induced in a Liquefiable Layer, Calcuated by Eq. 96 (Boulanger and Idriss, 2008)
(Strain N/A if Factor of Safety against Liquefaction > 1.3)

APPENDIX G

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-1

JOB NO.: 21G147-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 3/26/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: 29 feet
CAVE DEPTH: 33 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		14			ALLUVIUM: Brown fine Sandy Silt, little Clay, trace fine root fibers, slightly porous, medium dense-damp		9					
		34	4.5		Gray Brown Silty Clay, abundant calcareous nodules and veining, very stiff to hard-very moist		26					
5		26	4.5		@ 6 feet, trace fine Sand		18					
		32	4.5		Red Brown fine Sandy Clay, trace medium Sand, little to some iron oxide staining, hard-damp to moist		10					
10												
		16			Red Brown Silty fine to medium Sand, trace Clay, medium dense to very dense-damp to moist		6					
15												
		54					8					
20												
		30					5					
25												
		23			Brown fine Sandy Silt, trace Clay, little iron oxide staining, medium dense-very moist to wet		16			66		
30												
		34			Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, dense-wet		10					

TBL 21G147-1.GPJ SOCALGEO.GDT 4/16/21

TEST BORING LOG

PLATE B-1a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-1

JOB NO.: 21G147-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 3/26/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: 29 feet
CAVE DEPTH: 33 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, dense-wet							
					Brown Silty fine to coarse Sand, dense-wet							
		30			@ 38½ feet, Brown fine Sandy Clay lense		12					
40												
					Red Brown, Clayey fine to medium Sand, medium dense to dense-wet							
		24	4.5				11			34		
45												
		32	2.5				15					
50												
					Boring Terminated at 50'							

TBL 21G147-1.GPJ SOCALGEO.GDT 4/16/21

TEST BORING LOG **PLATE B-1b**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-2

JOB NO.: 21G147-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 3/26/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 19 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		28	3.0		ALLUVIUM: Gray Brown, Silty Clay, little fine Sand, very stiff-damp to moist	102	12					EI = 56 0 to 5 feet
		79/10"	4.5		@ 3 feet, trace medium to coarse Sand, moderately cemented, some calcareous nodules and veining, hard	110	10					
5		50/5"			Light Red Brown Silty fine Sand, little Clay, trace medium to coarse Sand, slightly cemented, trace calcareous nodules and veining, very dense-damp		4					Disturbed
		93/11"	4.5		Light Red Brown fine Sandy Clay, little to some Silt, trace calcareous nodueles and veining, hard-damp	126	8					
		99/11"	4.5			129	9					
10												
					Red Brown Silty Clay, trace fine to coarse Sand, hard-moist							
		81/11"	4.5			120	11					
15												
					Red Brown Clayey fine to medium Sand, trace fine Gravel, slightly cemented, very dense-damp to moist							
		88/10"					8					
20												
					Boring Terminated at 20'							

TBL 21G147-1.GPJ SOCALGEO.GDT 4/16/21

TEST BORING LOG

PLATE B-2

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-3

JOB NO.: 21G147-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 3/26/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 13 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		28			ALLUVIUM: Gray Brown fine Sandy Silt, little to some calcareous nodules and veining, medium dense-moist	100	13					
		42	4.5		Gray Brown Silty Clay, little fine Sand, some calcareous nodules and veining, very stiff-moist	112	13					
5		34/11"			Light Red Brown Silty fine to coarse Sand, trace to little Clay, little calcareous nodules and veining, very dense-moist	118	9					
		37	4.5		Light Red Brown Silty Clay, little fine Sand, little calcareous nodules and veining, very stiff-damp	105	9					
		71			Light Red Brown Silty fine Sand, trace Clay, dense-damp	121	7					
10												
		39			Brown Clayey fine to medium Sand, some Silt, dense-damp		8					
15					Boring Terminated at 15'							

TBL 21G147-1.GPJ SOCALGEO.GDT 4/16/21

TEST BORING LOG

PLATE B-3

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-4

JOB NO.: 21G147-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 3/26/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 15 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		16			ALLUVIUM: Dark Gray Brown Silty fine Sand, little Clay, little to some calcareous nodules and veining, medium dense-damp to moist	98	8					
		87/11"	4.5		Brown Clayey Silt, little fine Sand, some calcareous nodules and veining, hard-damp	115	12					
5		81/10"			Gray Brown Silty fine Sand, little Clay, abundant to extensive calcareous nodules and veining, very dense-damp	104	9					
		36	4.5		Brown fine Sandy Clay, little Silt, little calcareous nodules and veining, very stiff-damp	120	9					
		41			Gray Brown Silty fine Sand, little Clay, medium dense-moist	104	9					
10					Gray Brown Clayey fine Sand, trace medium to coarse Sand, medium dense-damp							
		40			Gray Brown Clayey fine to medium Sand, trace coarse Sand, dense-moist		13					
15												
		65	4.0		Red Brown fine Sandy Clay, little Silt, hard-damp		12					
20					Boring Terminated at 20'							

TBL 21G147-1.GPJ SOCALGEO.GDT 4/16/21

TEST BORING LOG **PLATE B-4**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-5

JOB NO.: 21G147-1 | DRILLING DATE: 3/26/21 | WATER DEPTH: 27 feet
PROJECT: Proposed Warehouse | DRILLING METHOD: Hollow Stem Auger | CAVE DEPTH: 29 feet
LOCATION: Perris, California | LOGGED BY: Jamie Hayward | READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		24	2.5		ALLUVIUM: Gray Brown Silty Clay, little fine Sand, little calcareous noduels and veining, very stiff to hard-damp		10					
		32					4					
5		68	4.5		Light Red Brown fine Sandy Clay, little Silt, moderatly cemented, little calcareous nodules and veining, hard-damp to moist		7					
		44	4.5				13					
10					Brown Clayey fine Sand, little Silt, trace calcareous nodules and veining, dense-damp							
		34					7					
15					Red Brown fine Sandy Clay, some Silt, trace calcareous nodules and veining, hard-damp							
		84/11"	4.5				8					
20					Red Brown Clayey fine Sand, little Silt, little medium Sand, trace calcareous nodules and veining, little iron oxide staining, medium dense-damp							
		26					7			22		
25												
		33			@ 28½ feet, wet		11					
30					Red Brown Clayey fine to medium Sand, trace Silt, trace coarse Sand, little iron oxide staining, medium dense-wet							
		16					12			26		

TBL 21G147-1.GPJ SOCALGEO.GDT 4/16/21

TEST BORING LOG

PLATE B-5a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-5

JOB NO.: 21G147-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 3/26/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: 27 feet
CAVE DEPTH: 29 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					Red Brown Clayey fine to medium Sand, trace Silt, trace coarse Sand, little iron oxide staining, medium dense-wet							
		28			@ 38½ feet, little calcareous nodules and veining		20			44		
40												
					Gray Brown fine to coarse Sand, trace Silt, dense-wet							
		39					14					
					Red Brown Silty fine Sand, trace calcareous nodules and veining, dense-wet		14					
45												
					Gray Brown fine to coarse Sand, trace Silt, very dense-wet							
		81/10"					29					
50												
					Boring Terminated at 50'							

TBL 21G147-1.GPJ SOCALGEO.GDT 4/16/21

TEST BORING LOG

PLATE B-5b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-6

JOB NO.: 21G147-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 3/26/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 8 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		18			ALLUVIUM: Brown Silty fine Sand, little calcareous nodules and veining, medium dense-moist		10					
		50			Brown Clayey fine Sand, some Silt, very dense-damp		7					
5		66	4.5		Gray Brown fine Sandy Clay, little Silt, trace calcareous nodules and veining, dense to very dense-damp		8					
		45	4.5				8					
10					Boring Terminated at 10'							

TBL 21G147-1.GPJ SOCALGEO.GDT 4/16/21

TEST BORING LOG

PLATE B-6

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-7

JOB NO.: 21G147-1
PROJECT: Proposed Warehouse
LOCATION: Perris, California

DRILLING DATE: 3/26/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: --
READING TAKEN: At Completion

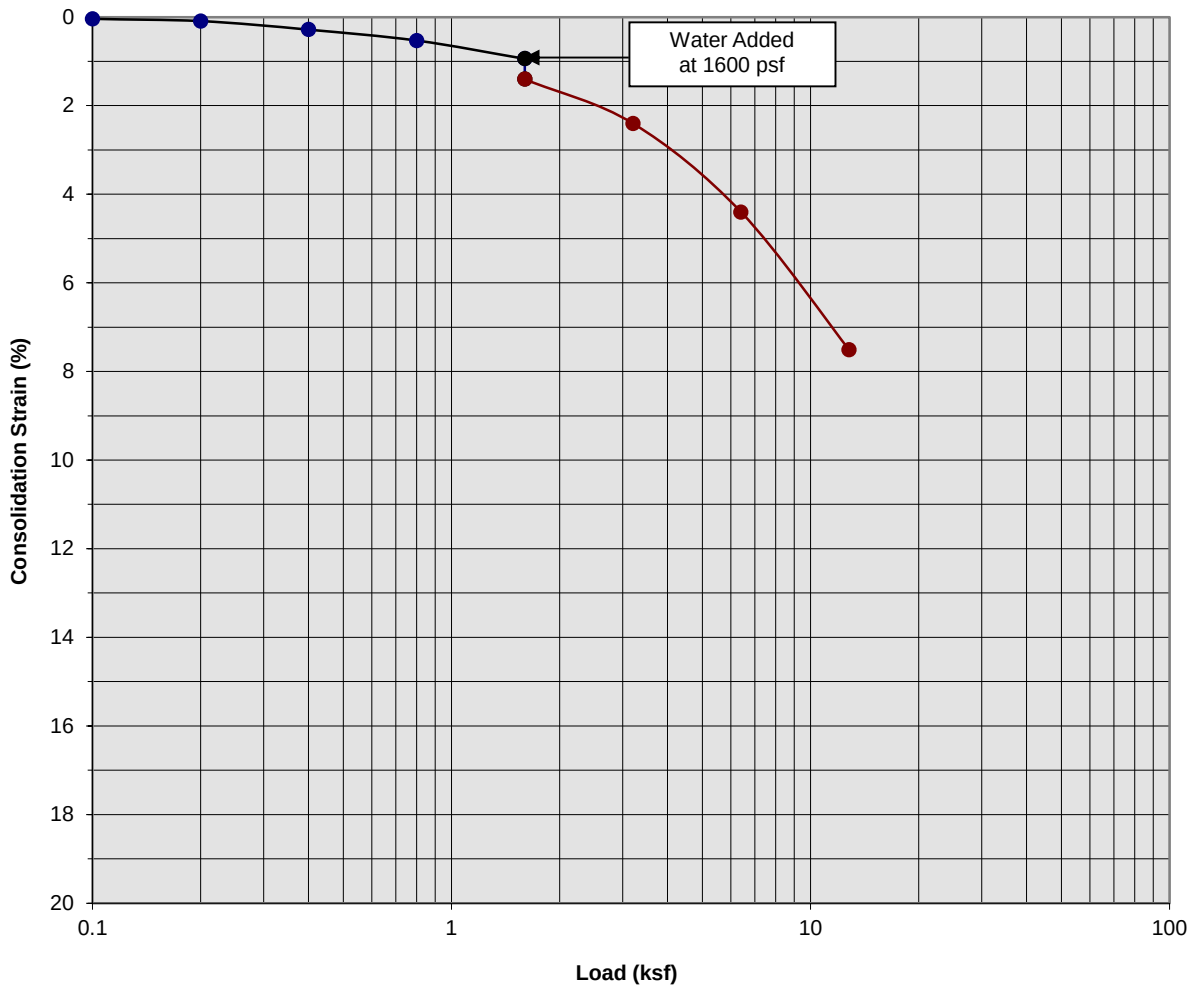
FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		17	4.5		ALLUVIUM: Dark Gray Brown Silty Clay, little fine to coarse Sand, little calcareous nodules and veining, slightly cemented, very stiff-damp		11					
		17			Light Brown fine to coarse Sand, trace Silt, medium dense-dry to damp		2					
5		22			Gray Brown Silty fine Sand, little Clay, little calcareous nodules and veining, little iron oxide staining, medium dense-moist		10					
		40			Red Brown Clayey fine Sand, little iron oxide staining, trace calcareous nodules and veining, dense-damp to moist		8					
10					Boring Terminated at 10'							

TBL 21G147-1.GPJ SOCALGEO.GDT 4/16/21

TEST BORING LOG

PLATE B-7

Consolidation/Collapse Test Results



Classification: Gray Brown Silty Clay, little fine Sand

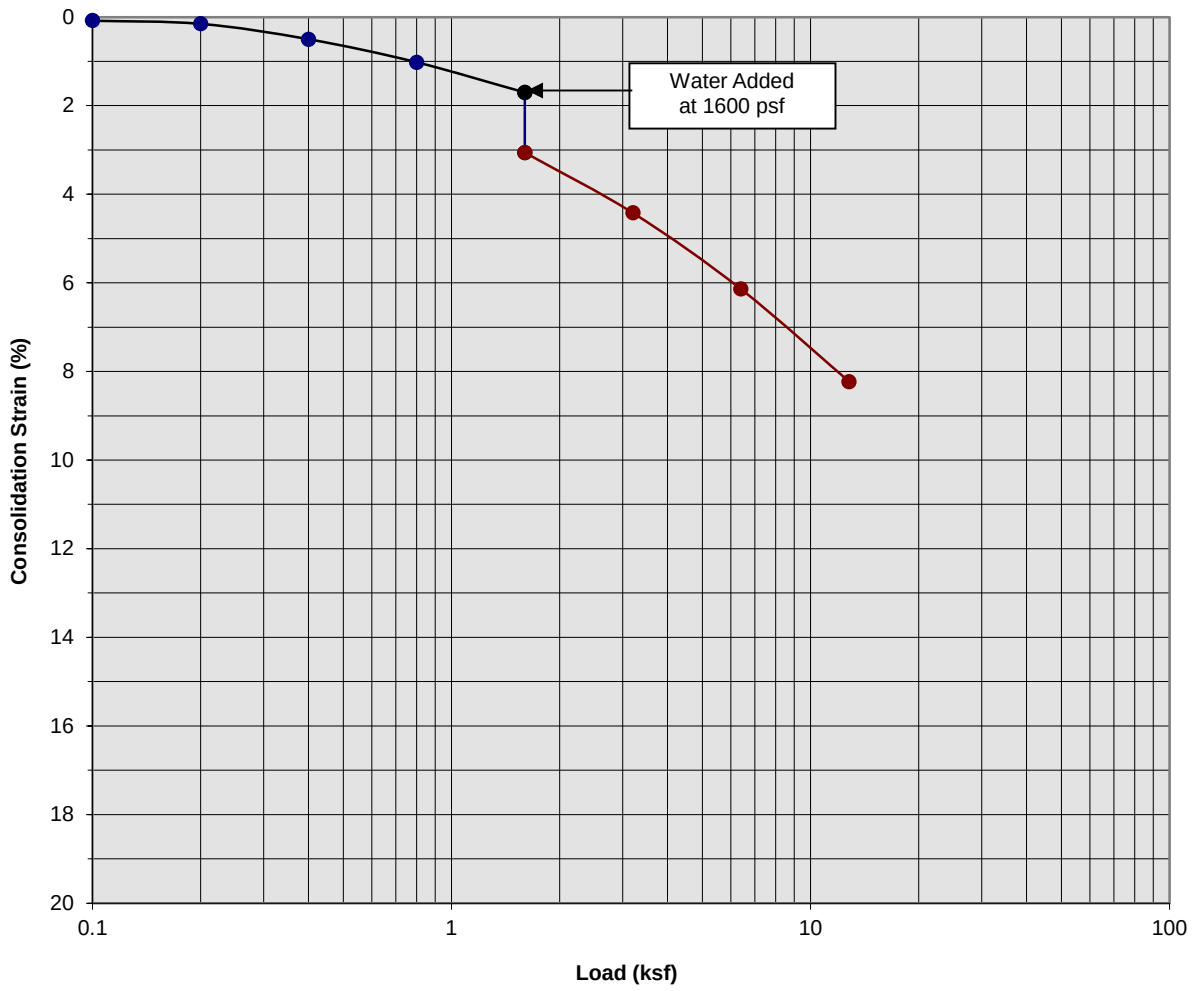
Boring Number:	B-3	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	21
Depth (ft)	3 to 4	Initial Dry Density (pcf)	112.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	121.1
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.46

Proposed Warehouse
Perris, CA
Project No. 21G147-1

PLATE C- 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: Light Red Brown Silty fine to coarse Sand, trace to little Clay

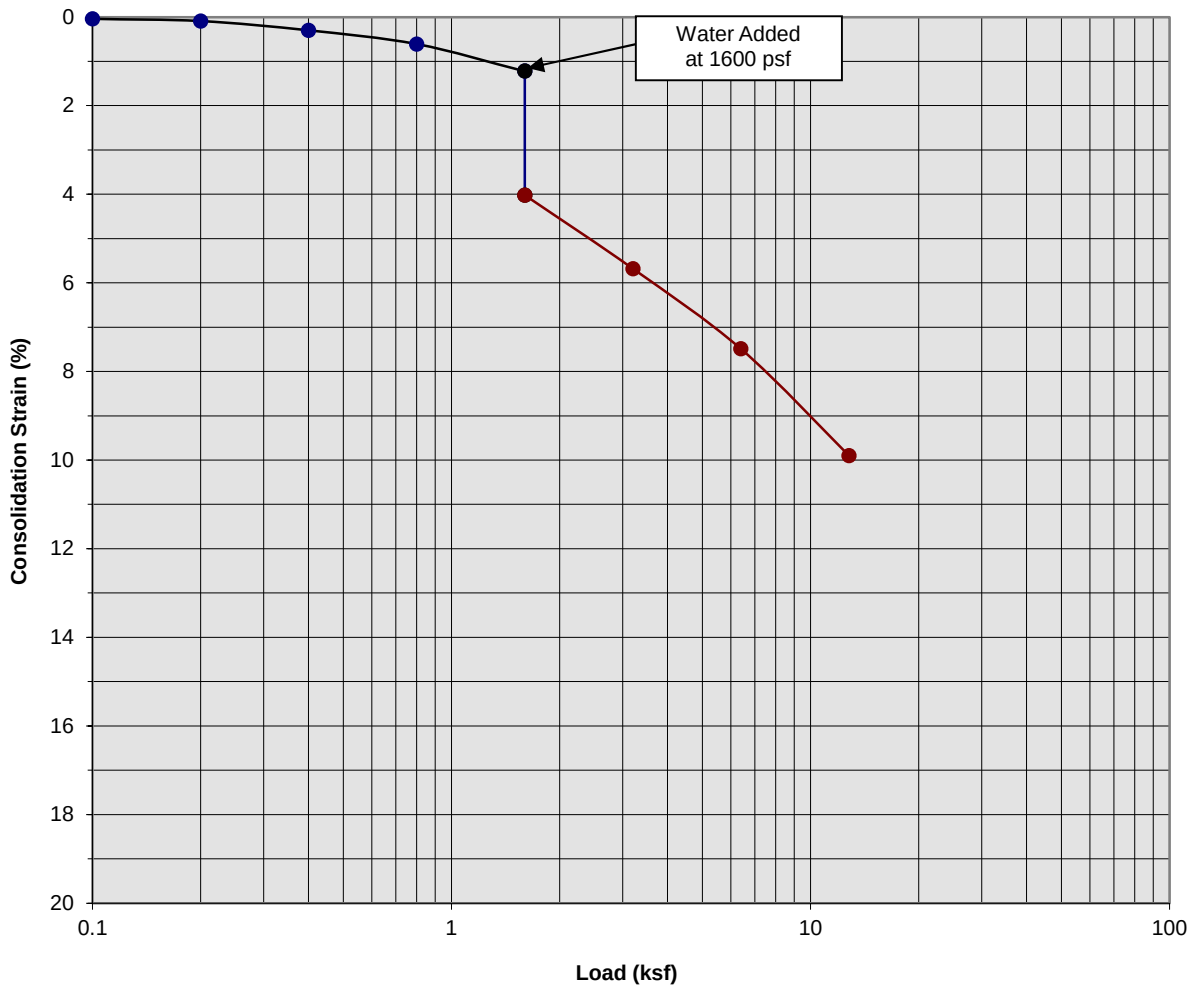
Boring Number:	B-3	Initial Moisture Content (%)	9
Sample Number:	---	Final Moisture Content (%)	20
Depth (ft)	5 to 6	Initial Dry Density (pcf)	118.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	128.6
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.36

Proposed Warehouse
Perris, CA
Project No. 21G147-1

PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: Light Red Brown Silty Clay, little fine Sand

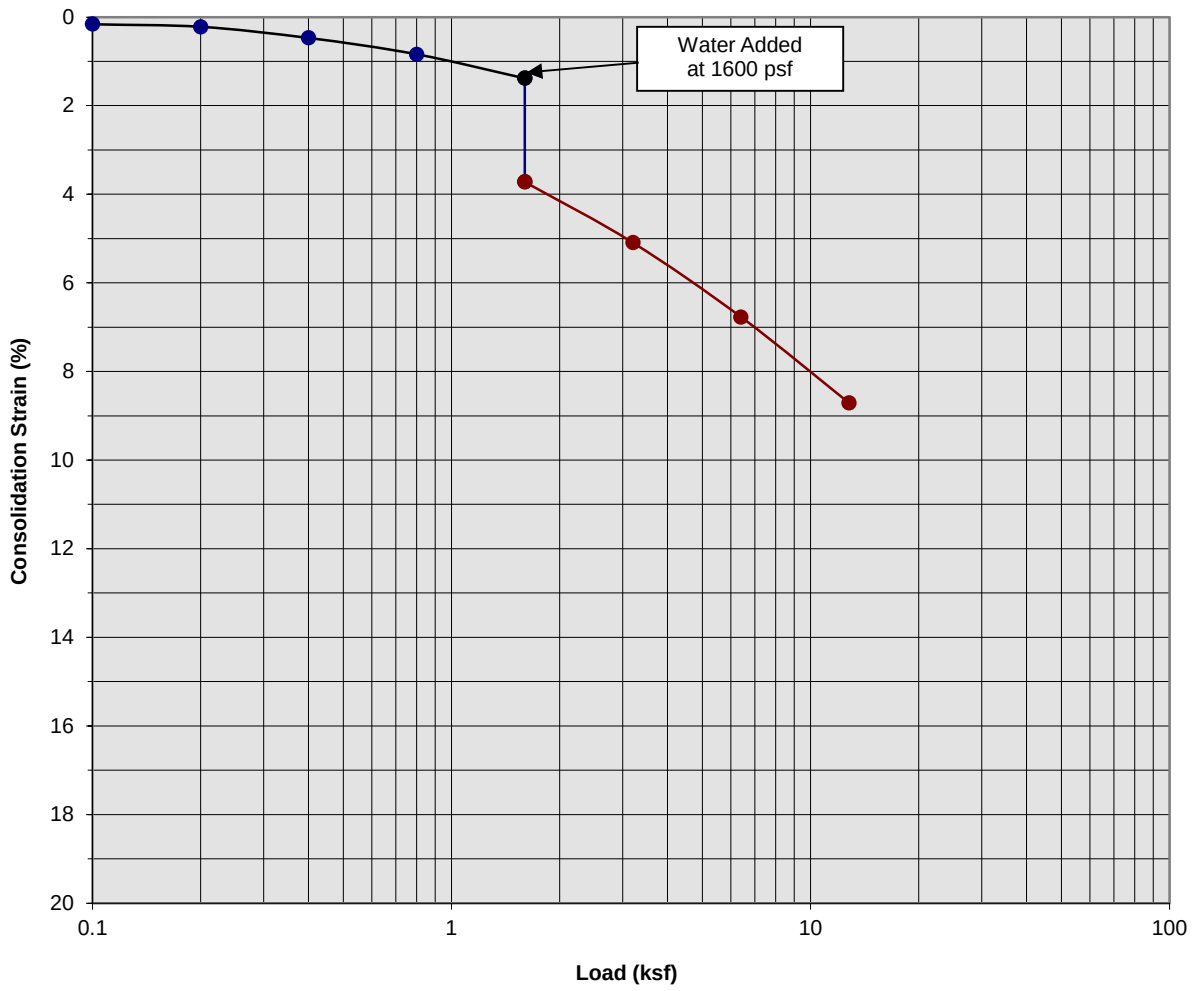
Boring Number:	B-3	Initial Moisture Content (%)	9
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	7 to 8	Initial Dry Density (pcf)	105.2
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	116.7
Specimen Thickness (in)	1.0	Percent Collapse (%)	2.80

Proposed Warehouse
Perris, CA
Project No. 21G147-1

PLATE C- 3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: Light Red Brown Silty fine Sand, trace Clay

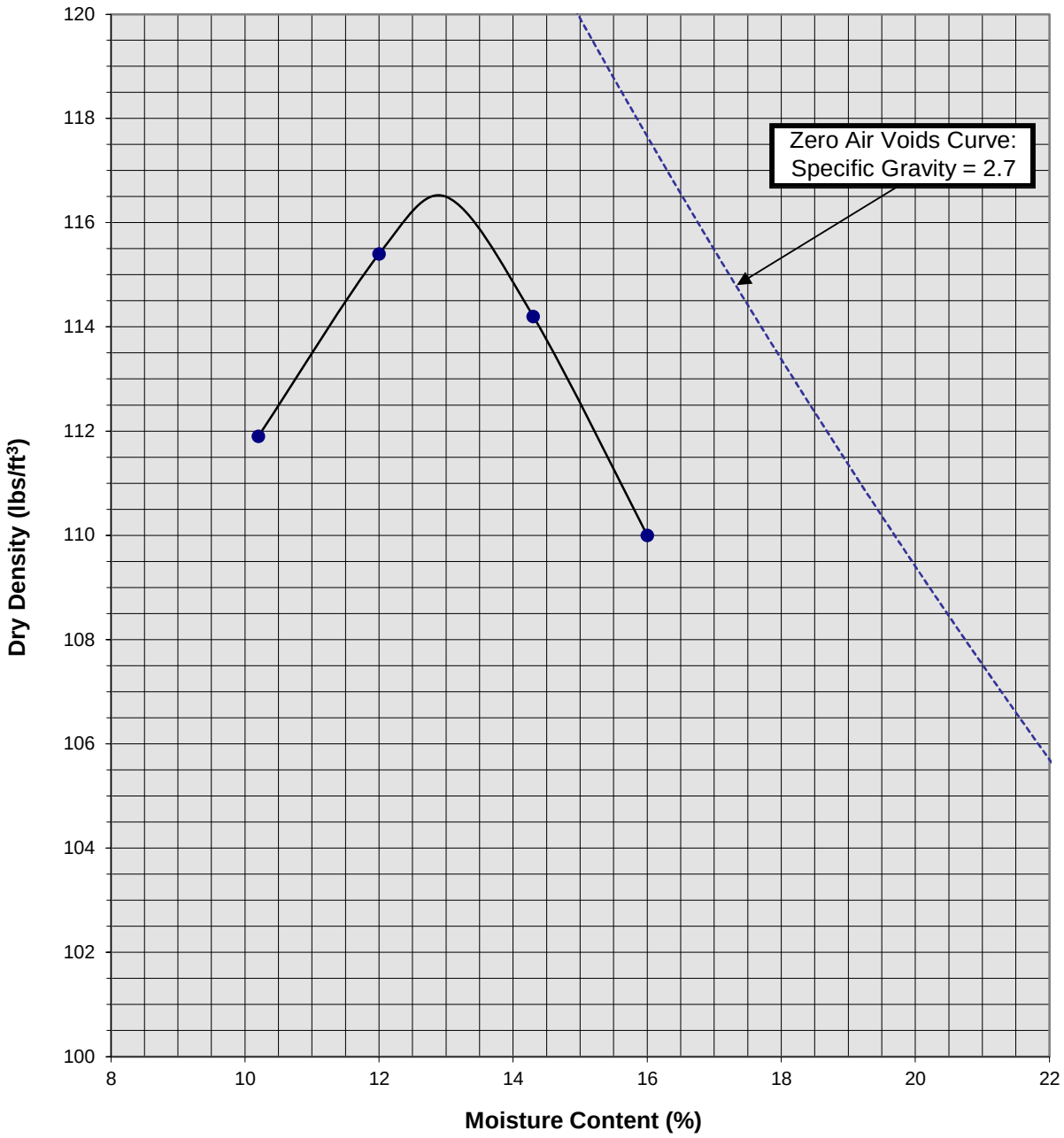
Boring Number:	B-3	Initial Moisture Content (%)	7
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	9 to 10	Initial Dry Density (pcf)	121.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	132.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	2.34

Proposed Warehouse
Perris, CA
Project No. 21G147-1

PLATE C- 4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Moisture/Density Relationship
ASTM D-1557



Soil ID Number	B-3 @ 0-5'
Optimum Moisture (%)	13
Maximum Dry Density (pcf)	116.5
Soil Classification	Gray Brown Silty Clay, some fine Sand

Proposed Warehouse
Perris, California
Project No. 21G147-1

PLATE C-5

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

Not included.

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

N/A – Based on the infiltration investigation from the geotechnical engineer, infiltration is not technically feasible. Therefore, one (1) bioretention facility, two (2) proprietary underground CMP detention pipes (storage) and three (3) proprietary Modular Wetland Systems are proposed for this project.

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	SDH & Associates, Inc.	Date	9/8/2023
Designed by	NM	Case No	P21-00015
Company Project Number/Name	2105 / Lake Creek-Placentia		

BMP Identification

BMP NAME / ID: Bioretention Facility / BMP 1

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.63 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA 1-1	*49,345*	*Ornamental Landscaping*	*0.1*	*0.11*	*5450.6*			
DMA 1-2	*93,185*	*Concrete or Asphalt*	*1*	*0.89*	*83121*			
DMA 1-3	*39,983*	*Roofs*	*1*	*0.89*	*35664.8*			
	182513		***Total***		**124236.4**	**0.63**	***6522.4***	***6,631***

Notes:

Bioretention Facility - Design Procedure	BMP ID 1	Legend:	Required Entries / Calculated Cells

Company Name:	SDH & Associates, Inc.	Date:	8-Sep
Designed by:	NM	County/City Case No.:	P21-00015

Design Volume

Enter the area tributary to this feature	A_T=	4.2	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	6,522	ft^3

Type of Bioretention Facility Design

- (●) Side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	1.8	ft
Top Width of Bioretention Facility, excluding curb	w_T =	50.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.41	ft
Minimum Surface Area, A_m $A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$	A_M =	4,623	ft^2
Proposed Surface Area	A=	4,700	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		0.5	%
6" Check Dam Spacing		0	feet

Describe Vegetation: Other

Notes: In conformance with the County of Riverside Basin Grading guidelines, more than 50% of the interior bioretention facility side slopes will have 4:1 side slopes.

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	SDH & Associates, Inc.	Date	9/8/2023
Designed by	NM	Case No	P21-00015
Company Project Number/Name	2105 / Lake Creek-Placentia		

BMP Identification

BMP NAME / ID: Modular Wetland System (MWS-L-4-8-3'-10"-V-UG) / BMP 2

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.63 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA 2-1	*3,356*	*Ornamental Landscaping*	*0.1*	*0.11*	*370.7*			
DMA 2-2	*17,825*	*Concrete or Asphalt*	*1*	*0.89*	*15899.9*			
	21181	***Total***			**16270.6**	**0.63**	***854.2***	***N/A***

Notes:

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	SDH & Associates, Inc.	Date	9/8/2023
Designed by	NM	Case No	P21-00015
Company Project Number/Name	2105 / Lake Creek-Placentia		

BMP Identification

BMP NAME / ID: Modular Wetland System (MWS-L-4-8-3'-10"-V-UG) / BMP 2

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
DMA 2-1	*3,356*	*Ornamental Landscaping*	*0.1*	*0.11*	*370.7*			
DMA 2-2	*17,825*	*Concrete or Asphalt*	*1*	*0.892*	*15899.9*			
	21181	***Total***			***16270.6***	***0.20***	***0.1***	***0.115***

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	SDH & Associates, Inc.	Date	9/8/2023
Designed by	NM	Case No	P21-00015
Company Project Number/Name	2105 / Lake Creek-Placentia		

BMP Identification

BMP NAME / ID: Contech 30-inch Diameter CMP Detention System (storage) / BMP 3

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.63 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA 3-1	*36,386*	*Ornamental Landscaping*	*0.1*	*0.11*	*4019.1*			
DMA 3-2	*183,239*	*Concrete or Asphalt*	*1*	*0.89*	*163449.2*			
DMA 3-3	*282,041*	*Roofs*	*1*	*0.89*	*251580.6*			
	501666		***Total***		**419048.9**	**0.63**	***22000.1***	***22,101***

Notes:

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: SDH & Associates, Inc. Date: 9/8/2023

Designed by: NM Case No: P21-00015

Company Project Number/Name: 2105 / Lake Creek-Placentia

BMP Identification

BMP NAME / ID: Contech 30-inch Diameter CMP Detention System (storage) / BMP 3

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

	DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
DMAs	*DMA 3-1*	*36,386*	*Ornamental Landscaping*	*0.1*	*0.11*	*4019.1*			
	DMA 3-2	*183,239*	*Concrete or Asphalt*	*1*	*0.892*	*163449.2*			
	DMA 3-3	*282,041*	*Roofs*	*1*	*0.892*	*251580.6*			
		501666	***Total***			**419048.9**	**0.20**	***1.9***	***>1.9 - N/A***

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	SDH & Associates, Inc.	Date	9/8/2023
Designed by	NM	Case No	P21-00015
Company Project Number/Name	2105 / Lake Creek-Placentia		

BMP Identification

BMP NAME / ID: Modular Wetland System (MWS-L-8-20-3'-6"-V-UG) - Volume-based / BMP 3

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.63 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA 3-1	*36,386*	*Ornamental Landscaping*	*0.1*	*0.11*	*4019.1*			
DMA 3-2	*183,239*	*Concrete or Asphalt*	*1*	*0.89*	*163449.2*			
DMA 3-3	*282,041*	*Roofs*	*1*	*0.89*	*251580.6*			
	501666		***Total***		**419048.9**	**0.63**	***22000.1***	***22,001***

Notes:

For DMA 3 (BMP 3), a combination of an underground storage facility and treatment unit, Modular Wetland System (MWS) is provided to address the storm water management requirement. The capacity of the underground storage facility is the minimum water quality design capture volume and the volume is slowly released to the downstream MWS.

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: SDH & Associates, Inc. — Date: 9/8/2023

Designed by: NM — Case No: P21-00015

Company Project Number/Name: 2105 / Lake Creek-Placentia

BMP Identification

BMP NAME / ID: Modular Wetland System (MWS-L-8-20-3'-6"-V-UG) - Volume-based / BMP 3

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

	DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
DMAs	*DMA 3-1*	*36,386*	*Ornamental Landscaping*	*0.1*	*0.11*	*4019.1*			
	DMA 3-2	*183,239*	*Concrete or Asphalt*	*1*	*0.892*	*163449.2*			
	DMA 3-3	*282,041*	*Roofs*	*1*	*0.892*	*251580.6*			
		501666	***Total***			**419048.9**	**0.20**	***1.9***	***>1.9 - N/A***

Notes:

For DMA 3 (BMP 3), this "QBMP" calculation summary sheet is provided for reference purpose. The proposed flow rate is labeled as "N/A" since the proposed BMP for this project takes the "volume-based" approach using a combination of an underground storage and a Modular Wetland System.

Santa Ana Watershed - BMP Design Volume, V_{BMP}
(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: SDH & Associates, Inc. | Date: 9/8/2023
Designed by: NM | Case No: P21-00015
Company Project Number/Name: 2105 / Lake Creek-Placentia

BMP Identification

BMP NAME / ID: Contech 30-inch Diameter CMP Detention System (storage) / BMP 4

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.63 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA 4-1	*4,032*	*Ornamental Landscaping*	*0.1*	*0.11*	*445.4*			
DMA 4-2	*151,843*	*Concrete or Asphalt*	*1*	*0.89*	*135444*			
DMA 4-3	*250,149*	*Roofs*	*1*	*0.89*	*223132.9*			
	406024	***Total***			**359022.3**	**0.63**	***18848.7***	***18,860***

Notes:

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: SDH & Associates, Inc. — Date: 9/8/2023

Designed by: NM — Case No: P21-00015

Company Project Number/Name: 2105 / Lake Creek-Placentia

BMP Identification

BMP NAME / ID: Contech 30-inch Diameter CMP Detention System (storage) / BMP 4

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs	DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
	DMA 4-1	*4,032*	*Ornamental Landscaping*	*0.1*	*0.11*	*445.4*			
	DMA 4-2	*151,843*	*Concrete or Asphalt*	*1*	*0.892*	*135444*			
	DMA 4-3	*250,149*	*Roofs*	*1*	*0.892*	*223132.9*			
		406024	***Total***			**359022.3**	**0.20**	***1.6***	***>1.6 - N/A***

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries; Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	SDH & Associates, Inc.	Date	9/8/2023
Designed by	NM	Case No	P21-00015
Company Project Number/Name	2105 / Lake Creek-Placentia		

BMP Identification

BMP NAME / ID: Modular Wetland System (MWS-L-8-16-4'-0"-V-UG) - Volume-based / BMP 4

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.63 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA 4-1	*4,032*	*Ornamental Landscaping*	*0.1*	*0.11*	*445.4*			
DMA 4-2	*151,843*	*Concrete or Asphalt*	*1*	*0.89*	*135444*			
DMA 4-3	*250,149*	*Roofs*	*1*	*0.89*	*223132.9*			
	406024	***Total***			**359022.3**	**0.63**	***18848.7***	***18,849***

Notes:

For DMA 4 (BMP 4), a combination of an underground storage facility and treatment unit, Modular Wetland System (MWS) is provided to address the storm water management requirement. The capacity of the underground storage facility is the minimum water quality design capture volume and the volume is slowly released to the downstream MWS.

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: SDH & Associates, Inc.
Date: 9/8/2023
Designed by: NM
Case No: P21-00015
Company Project Number/Name: 2105 / Lake Creek-Placentia

BMP Identification

BMP NAME / ID: Modular Wetland System (MWS-L-8-16-4'-0"-V-UG) - Volume-based / BMP 4

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

	DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Rainfall Intensity (in/hr)*	*Design Flow Rate (cfs)*	*Proposed Flow Rate (cfs)*
DMAs	*DMA 4-1*	*4,032*	*Ornamental Landscaping*	*0.1*	*0.11*	*445.4*			
	DMA 4-2	*151,843*	*Concrete or Asphalt*	*1*	*0.892*	*135444*			
	DMA 4-3	*250,149*	*Roofs*	*1*	*0.892*	*223132.9*			
		406024	***Total***			**359022.3**	**0.20**	***1.6***	***>1.6 - N/A***

Notes:

For DMA 4 (BMP 4), this "QBMP" calculation summary sheet is provided for reference purpose. The proposed flow rate is labeled as "N/A" since the proposed BMP for this project takes the "volume-based" approach using a combination of an underground storage and a Modular Wetland System.

CONTECH ENGINEERED SOLUTIONS

Date: 9/19/2023
Project Name: BMP 3 - 38135 (9-19-2023 22-19-37)

City / County:
State:

Designed By:
Company:
Telephone:

CMP: Underground Detention System
Storage Volume Estimation

=Adjustable Input Cells

Contech Engineered Solutions, LLC is pleased to offer the following estimate of storage volume for the above named project. The results are submitted as an estimate only, without liability on the part of Contech Engineered Solutions, LLC for accuracy or suitability to any particular applicaton and are subject to verification of the Engineer of Record. **This tool is only applicable for rectangular shaped systems.**

Summary of Inputs

System Information		Backfill Information		Pipe & Analysis Information	
Out-to-out length (ft):	182.0	Backfill Porosity (%):	40%	System Diameter (in):	30
Out-to-out width (ft):	58.8	Depth Above Pipe (in):	6.0	Pipe Spacing (in):	15
Number of Manifolds (ea):	2.0	Depth Below Pipe (in):	0.0	Incremental Analysis (in):	2
Number of Barrels (ea):	16.0	Width At Ends (ft):	1.0	System Invert (Elevation):	0
		Width At Sides (ft):	1.0		

Storage Volume Estimation

System		Pipe		Stone		Total System		Miscellaneous	
Depth (ft)	Elevation (ft)	Incremental Storage (cf)	Cumulative Storage (cf)	Incremental Storage (cf)	Cumulative Storage (cf)	Incremental Storage (cf)	Cumulative Storage (cf)	Percent Open Storage (%)	Ave. Surface Area (sf)
0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0%	4,471.2
0.17	0.16	414.5	414.5	579.4	579.4	993.9	993.9	41.7%	6,678.4
0.33	0.33	733.1	1,147.6	452.0	1,031.4	1,185.0	2,179.0	52.7%	7,479.1
0.50	0.50	913.8	2,061.4	379.7	1,411.0	1,293.5	3,472.4	59.4%	8,010.6
0.67	0.66	1,038.1	3,099.5	330.0	1,741.0	1,368.0	4,840.5	64.0%	8,384.2
0.83	0.83	1,125.2	4,224.7	295.1	2,036.1	1,420.3	6,260.8	67.5%	8,642.4
1.00	1.00	1,183.4	5,408.1	271.8	2,308.0	1,455.3	7,716.1	70.1%	8,806.1
1.17	1.16	1,217.0	6,625.1	258.4	2,566.3	1,475.4	9,191.5	72.1%	8,885.6
1.33	1.33	1,228.0	7,853.2	254.0	2,820.3	1,482.0	10,673.5	73.6%	8,885.6
1.50	1.50	1,217.0	9,070.2	258.4	3,078.7	1,475.4	12,148.9	74.7%	8,806.1
1.67	1.66	1,183.4	10,253.7	271.8	3,350.5	1,455.3	13,604.2	75.4%	8,642.4
1.83	1.83	1,125.2	11,378.8	295.1	3,645.7	1,420.3	15,024.5	75.7%	8,384.2
2.00	2.00	1,038.1	12,416.9	330.0	3,975.6	1,368.0	16,392.6	75.7%	8,010.6
2.17	2.16	913.8	13,330.7	379.7	4,355.3	1,293.5	17,686.0	75.4%	7,479.1
2.33	2.33	733.1	14,063.8	452.0	4,807.3	1,185.0	18,871.1	74.5%	6,678.4
2.50	2.50	414.5	14,478.3	579.4	5,386.7	993.9	19,865.0	72.9%	4,471.2
2.67	2.66	0.0	14,478.3	745.2	6,131.9	745.2	20,610.2	70.2%	4,471.2
2.83	2.83	0.0	14,478.3	745.2	6,877.1	745.2	21,355.4	67.8%	4,471.2
3.00	3.00	0.0	14,478.3	745.2	7,622.3	745.2	22,100.6	65.5%	4,471.2

These results are submitted to you as a guideline only, without liability on the part of CONTECH Engineered Solutions, LLC for accuracy or suitability to any particular application, and are subject to your verification.

CONTECH ENGINEERED SOLUTIONS

Date: 9/19/2023
Project Name: BMP 4 - 38147 (9-19-2023 22-23-1)

City / County:
State:

Designed By:
Company:
Telephone:

CMP: Underground Detention System
Storage Volume Estimation

=Adjustable Input Cells

Contech Engineered Solutions, LLC is pleased to offer the following estimate of storage volume for the above named project. The results are submitted as an estimate only, without liability on the part of Contech Engineered Solutions, LLC for accuracy or suitability to any particular applicaton and are subject to verification of the Engineer of Record. **This tool is only applicable for rectangular shaped systems.**

Summary of Inputs

System Information		Backfill Information		Pipe & Analysis Information	
Out-to-out length (ft):	155.0	Backfill Porosity (%):	40%	System Diameter (in):	30
Out-to-out width (ft):	58.8	Depth Above Pipe (in):	6.0	Pipe Spacing (in):	15
Number of Manifolds (ea):	2.0	Depth Below Pipe (in):	0.0	Incremental Analysis (in):	2
Number of Barrels (ea):	16.0	Width At Ends (ft):	1.0	System Invert (Elevation):	0
		Width At Sides (ft):	1.0		

Storage Volume Estimation

System		Pipe		Stone		Total System		Miscellaneous	
Depth (ft)	Elevation (ft)	Incremental Storage (cf)	Cumulative Storage (cf)	Incremental Storage (cf)	Cumulative Storage (cf)	Incremental Storage (cf)	Cumulative Storage (cf)	Percent Open Storage (%)	Ave. Surface Area (sf)
0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0%	3,815.1
0.17	0.16	353.8	353.8	494.3	494.3	848.1	848.1	41.7%	5,699.0
0.33	0.33	625.7	979.5	385.6	879.9	1,011.3	1,859.4	52.7%	6,382.5
0.50	0.50	780.0	1,759.5	323.9	1,203.8	1,103.8	2,963.2	59.4%	6,836.1
0.67	0.66	886.0	2,645.5	281.4	1,485.2	1,167.5	4,130.7	64.0%	7,154.9
0.83	0.83	960.4	3,605.9	251.7	1,736.9	1,212.1	5,342.8	67.5%	7,375.4
1.00	1.00	1,010.1	4,616.0	231.8	1,968.7	1,241.9	6,584.7	70.1%	7,515.1
1.17	1.16	1,038.8	5,654.8	220.3	2,189.0	1,259.1	7,843.8	72.1%	7,582.9
1.33	1.33	1,048.2	6,703.0	216.6	2,405.6	1,264.8	9,108.6	73.6%	7,582.9
1.50	1.50	1,038.8	7,741.8	220.3	2,625.9	1,259.1	10,367.7	74.7%	7,515.1
1.67	1.66	1,010.1	8,751.9	231.8	2,857.8	1,241.9	11,609.6	75.4%	7,375.4
1.83	1.83	960.4	9,712.2	251.7	3,109.5	1,212.1	12,821.7	75.7%	7,154.9
2.00	2.00	886.0	10,598.3	281.4	3,390.9	1,167.5	13,989.2	75.8%	6,836.1
2.17	2.16	780.0	11,378.2	323.9	3,714.8	1,103.8	15,093.0	75.4%	6,382.5
2.33	2.33	625.7	12,003.9	385.6	4,100.3	1,011.3	16,104.3	74.5%	5,699.0
2.50	2.50	353.8	12,357.7	494.3	4,594.7	848.1	16,952.4	72.9%	3,815.1
2.67	2.66	0.0	12,357.7	635.8	5,230.5	635.8	17,588.2	70.3%	3,815.1
2.83	2.83	0.0	12,357.7	635.9	5,866.4	635.9	18,224.1	67.8%	3,815.1
3.00	3.00	0.0	12,357.7	635.8	6,502.2	635.8	18,859.9	65.5%	3,815.1

These results are submitted to you as a guideline only, without liability on the part of CONTECH Engineered Solutions, LLC for accuracy or suitability to any particular application, and are subject to your verification.

BMP 2 - PROPRIETARY MWS FLOW-BASED SIZING CHART
EXCERPT FOR REFERENCE PURPOSE

MWS Linear 2.0 HGL Sizing Calculations

MWS MODEL SIZE	WETLAND PERMITER LENGTH	LOADING RATE GPM/SF	HGL HEIGHT																												
			SHALLOW MODELS																			STANDARD HEIGHT MODEL	HIGH CAPACITY MODELS									
			1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.65	3.70	3.75	3.80	3.85	3.90	3.95
MWS-L-4-4	6.70	1.0	0.022	0.023	0.025	0.026	0.028	0.029	0.031	0.032	0.034	0.035	0.037	0.038	0.040	0.042	0.043	0.045	0.046	0.048	0.049	0.051	**0.052**	0.054	0.055	0.056	0.057	0.058	0.058	0.059	0.060	0.061
MWS-L-3-6	10.06	1.0	0.032	0.035	0.037	0.039	0.042	0.044	0.046	0.048	0.051	0.053	0.055	0.058	0.060	0.062	0.065	0.067	0.069	0.072	0.074	0.076	**0.078**	0.081	0.083	0.084	0.085	0.087	0.088	0.089	0.090	0.091
MWS-L-4-6	9.30	1.0	0.030	0.032	0.034	0.036	0.038	0.041	0.043	0.045	0.047	0.049	0.051	0.053	0.055	0.058	0.060	0.062	0.064	0.066	0.068	0.070	**0.073**	0.075	0.077	0.078	0.079	0.080	0.081	0.082	0.083	0.084
MWS-L-4-8	14.80	1.0	0.048	0.051	0.054	0.058	0.061	0.065	0.068	0.071	0.075	0.078	0.082	0.085	0.088	0.092	0.095	0.099	0.102	0.105	0.109	0.112	**0.115**	0.119	0.122	0.124	0.126	0.127	0.129	0.131	0.132	0.134
MWS-L-4-13	18.40	1.0	0.059	0.063	0.068	0.072	0.076	0.080	0.084	0.089	0.093	0.097	0.101	0.106	0.110	0.114	0.118	0.122	0.127	0.131	0.135	0.139	**0.144**	0.148	0.152	0.154	0.156	0.158	0.160	0.163	0.165	0.167
MWS-L-4-15	22.40	1.0	0.072	0.077	0.082	0.087	0.093	0.098	0.103	0.108	0.113	0.118	0.123	0.129	0.134	0.139	0.144	0.149	0.154	0.159	0.165	0.170	**0.175**	0.180	0.185	0.188	0.190	0.193	0.195	0.198	0.200	0.203
MWS-L-4-17	26.40	1.0	0.085	0.091	0.097	0.103	0.109	0.115	0.121	0.127	0.133	0.139	0.145	0.151	0.158	0.164	0.170	0.176	0.182	0.188	0.194	0.200	**0.206**	0.212	0.218	0.221	0.224	0.227	0.230	0.233	0.236	0.239
MWS-L-4-19	30.40	1.0	0.098	0.105	0.112	0.119	0.126	0.133	0.140	0.147	0.153	0.160	0.167	0.174	0.181	0.188	0.195	0.202	0.209	0.216	0.223	0.230	**0.237**	0.244	0.251	0.255	0.258	0.262	0.265	0.269	0.272	0.276
MWS-L-4-21	34.40	1.0	0.111	0.118	0.126	0.134	0.142	0.150	0.158	0.166	0.174	0.182	0.189	0.197	0.205	0.213	0.221	0.229	0.237	0.245	0.253	0.261	**0.268**	0.276	0.284	0.288	0.292	0.296	0.300	0.304	0.308	0.312
MWS-L-6-8	18.80	1.0	0.060	0.065	0.069	0.073	0.078	0.082	0.086	0.091	0.095	0.099	0.104	0.108	0.112	0.116	0.121	0.125	0.129	0.134	0.138	0.142	**0.147**	0.151	0.155	0.157	0.160	0.162	0.164	0.166	0.168	0.170
MWS-L-8-8	29.60	1.0	0.095	0.102	0.109	0.115	0.122	0.129	0.136	0.143	0.149	0.156	0.163	0.170	0.177	0.183	0.190	0.197	0.204	0.211	0.217	0.224	**0.231**	0.238	0.245	0.248	0.251	0.255	0.258	0.262	0.265	0.268
MWS-L-8-12	44.40	1.0	0.143	0.153	0.163	0.173	0.183	0.194	0.204	0.214	0.224	0.234	0.245	0.255	0.265	0.275	0.285	0.296	0.306	0.316	0.326	0.336	**0.346**	0.357	0.367	0.372	0.377	0.382	0.387	0.392	0.397	0.402
MWS-L-8-16	59.20	1.0	0.190	0.204	0.217	0.231	0.245	0.258	0.272	0.285	0.299	0.312	0.326	0.340	0.353	0.367	0.380	0.394	0.408	0.421	0.435	0.448	**0.462**	0.476	0.489	0.496	0.503	0.509	0.516	0.523	0.530	0.537
MWS-L-8-20	74.00	1.0	0.238	0.255	0.272	0.289	0.306	0.323	0.340	0.357	0.374	0.391	0.408	0.425	0.442	0.459	0.476	0.493	0.509	0.526	0.543	0.560	**0.577**	0.594	0.611	0.620	0.628	0.637	0.645	0.654	0.662	0.671
MWS-L-10-20 or MWS-L-8-24	88.80	1.0	0.285	0.306	0.326	0.346	0.367	0.387	0.408	0.428	0.448	0.469	0.489	0.509	0.530	0.550	0.571	0.591	0.611	0.632	0.652	0.673	**0.693**	0.713	0.734	0.744	0.754	0.764	0.774	0.785	0.795	0.805
4'x'4 media cage	14.80	1.0	0.048	0.051	0.054	0.058	0.061	0.065	0.068	0.071	0.075	0.078	0.082	0.085	0.088	0.092	0.095	0.099	0.102	0.105	0.109	0.112	**0.115**	0.119	0.122	0.124						

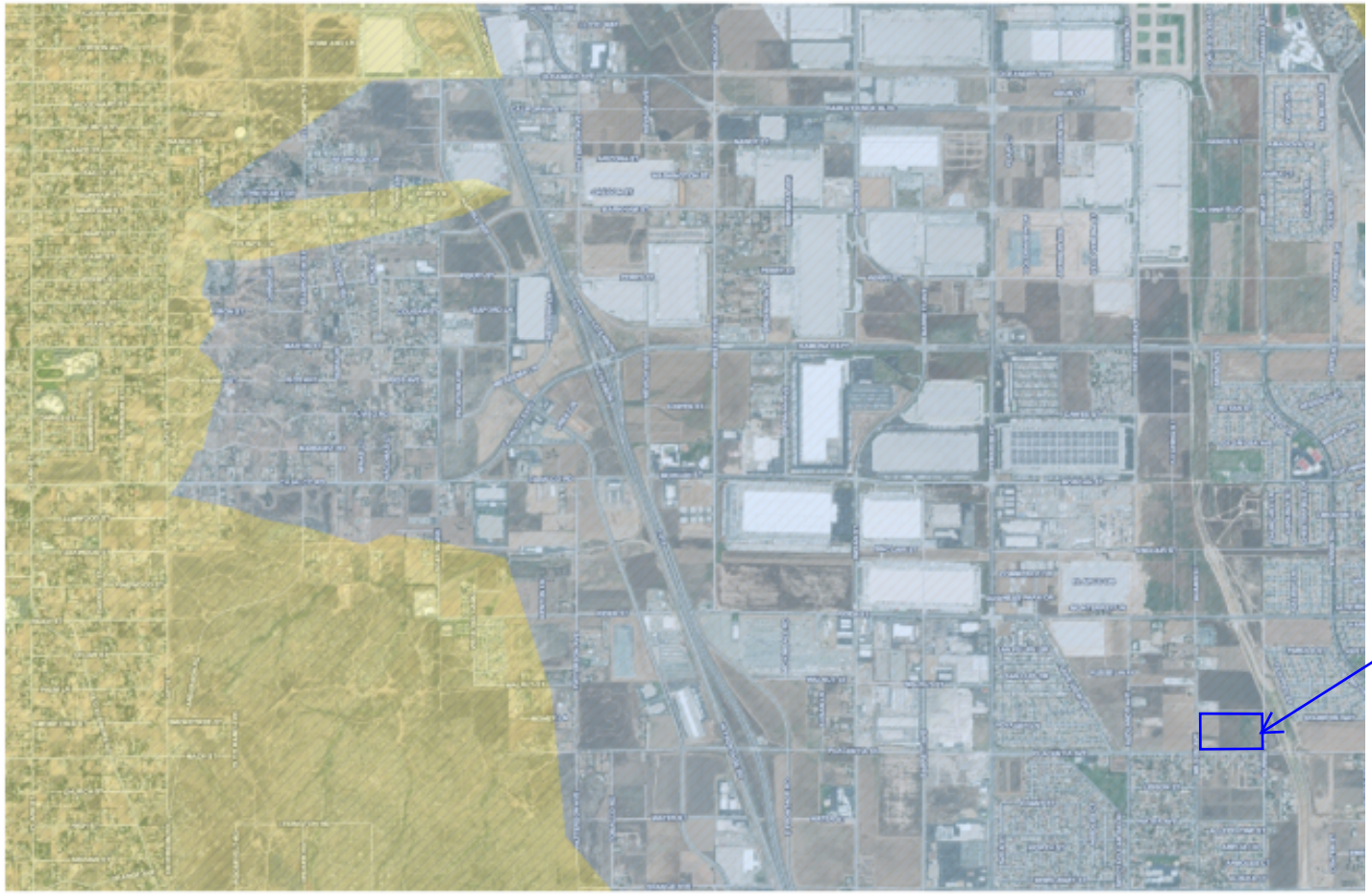
Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

Note: The project is within the Riverside County WAP HCOC Exemption area approved on April 20, 2017. Therefore, the project is exempt from the HCOC requirements.

SCREEN CAPTURE - RIVERSIDE COUTY STORM WATER & WATER CONSERVATION TRACKING TOOL

HCOC EXEMPTION AREAS



NOTE: THE PROJECT IS WITHIN THE RIVERSIDE COUNTY WAP HCOC EXEMPTION AREA APPROVED ON APRIL 20, 2017. THEREFORE, THE PROJECT SHOULD BE EXEMPT FROM THE HCOC REQUIREMENTS.

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

Note: The Source Control checklist will be prepared during final engineering (construction document) stage at the time of the final WQMP.

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

Note: The O&M Plan will be prepared during final engineering (construction document) stage at the time of the final WQMP.

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

Note: The following reference materials are anticipated to be included in this Appendix during final engineering stage at the time of the final WQMP.

- **SAMPLE – Employee Training Certification Log**
- **Riverside County Pamphlets**
- **BMP – Contech – CMP Detention Pipes (Storage)**
- **BMP – Modular Wetland System**
- **SC-10 – Non-Stormwater Discharges**
- **SC-11 – Spill Prevention, Control & Cleanup**
- **SC-21 – Vehicle and Equipment Cleaning (Maintenance)**
- **SC-30 – Outdoor Loading/Unloading**
- **SC-34 – Waste Handling and Disposal**
- **SC-41 – Building & Grounds Maintenance**
- **SC-43 – Parking/Storage Area Maintenance**
- **SC-60 – Housekeeping Practices**
- **SC-73 – Landscape Maintenance**
- **SC-74 – Drainage System Maintenance**
- **SD-10 – Site Design and Landscape Planning**
- **SD-11 – Roof Runoff Controls**
- **SD-12 – Efficient Irrigation**
- **SD-13 – Storm Drain Signage**
- **SD-31 – Maintenance Bays & Docks**
- **SD-32 – Trash Storage Areas**